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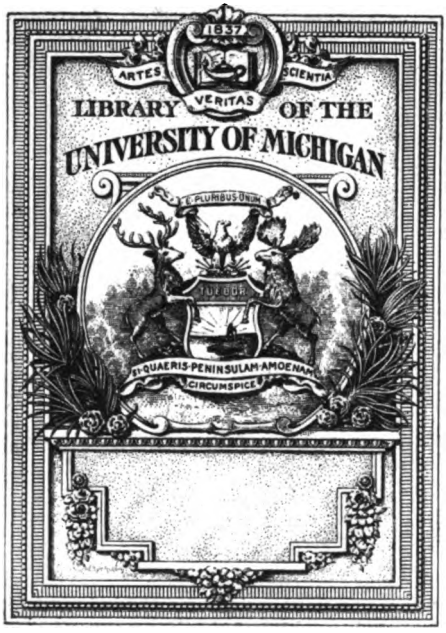

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OF

THE NEW YORK

Academy of Medicine

INSTITUTED 1847

SECOND SERIES. VOL. VIII.

PRINTED FOR THE ACADEMY

1892

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1889.... ALFRED L. LOOMIS, M.D., LL.D.

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*Deceased.

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LIST OF RESIDENT FELLOWS.

1884 Abbe, Robert
1891 Abbott, Frank
1890 Adams, Alpheus Ely
1889 Adams, Calvin Thayer
1847 *Adams, John Glover. Corresponding secretary, 1849; recording secretary, 1850, 1851; trustee, 1852; corresponding secretary, 1855, 1862–1867, 1870–1883. Died June 19th, 1884, aged 76
1886 Adler, Isaac
1884 Agan, David Henry
1859 *Agnew, Cornelius Rea. Trustee, 1884–1888. Benefactor. Died April 18th, 1888, aged 58
1886 Agramonte, Enrique Valeriano
1884 Aitkin, John Scott
1889 Alexander, Samuel
1880 Alexander, Welcome Taylor
1891 Alleman, Lewis Arthur Welles
1888 Allen, Charles Slover
1891 Allen, Charles Warrenne
1881 Allen, Thomas Herbert
1875 *Allin, Charles Mnason. Died February 11th, 1879, aged 51
1891 Altshul, Henry
1883 Amidon, Royal Wells. Resigned 1891
1847 *Anderson, James. Trustee, 1850–1861; vice-president, 1852–1855; president, 1861–1866; trustee, 1870–1875. Died October 7th, 1886, aged 89

* Deceased.

1867 Anderson, James Henry
1883 Anderton, William Bancroft
1847 *Andrews, Jarvis Mudge. Died January 26th, 1878, aged 60
1885 Andrews, Joseph Alfred
1887 Arcularius, Lewis
1891 Armstrong, Samuel Treat
1862 Arnold, Edmund Samuel Foster. Resigned 1886
1879 Arnold, Glover Crane. Resigned 1886
1889 Aronson, Moses
1887 Asch, Jacob Henry
1880 Asch, Morris Joseph
1877 Assenheimer, Augustus
1875 Ayers, Samuel. Resigned 1885
1882 Bacon, Gorham
1878 Badger, William. Resigned 1882
1865 Bahan, Thomas Sinnott
1867 Ball, Alonzo Brayton
1885 Balser, Henry
1885 Balser, William
1890 Baner, William Llewellyn
1880 Bangs, Lemuel Bolton
1890 Banks, Elbert Augustin
1862 *Banks, James Lenox. Trustee, 1869–1878. Died June 3d, 1883, aged 51
1854 *Barker, Benjamin Fordyce. President, 1881–1886. Died May 30th, 1891, aged 73
1847 *Barker, Luke. Died December 13th, 1849, aged 59
1888 Barnes, Justin Llewellen
1891 Barrows, Charles Clifford

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1854 *Barry, Robert Alexander. Died January 7th, 1882, aged 57
1862 Barstow, Josiah Whitney
1889 Barton, Joshua Lindley
1885 Baruch, Simon
1847 *Batchelder, John Putnam. Vice-president, 1851, 1852; president, 1858. Died April 7th, 1868, aged 82
1891 Bauer, Frederick Martin
1868 Bayles, George
1847 *Beadle, Edward Langdon. Corresponding secretary, 1850–1852; trustee, 1850–1852, 1858; vice-president, 1850, 1853–1857. Died April 5th, 1882, aged 73
1847 *Beales, John Charles. Died July 25th, 1878, aged 74
1847 *Beals, Gorham. Died January 9th, 1848, aged 29
1870 *Beard, George Miller. Died January 23d, 1883, aged 43
1887 Beck, Carl
1847 *Beck, John Brodhead. Vice-president, 1847, 1848. Died April 9th, 1851, aged 56
1880 Beckwith, Frank Edwin
1847 *Bedford, Gunning Samuel. Died September 5th, 1870, aged 64
1862 *Belden, Ebenezer Banks. Died August 20th, 1888, aged 68
1871 Bell, Christopher Mildeberger
1880 Benedict, Albert Clark
1890 Berens, T Passmore
1890 Berg, Henry Woolffe
1847 *Berger, Francis Eloi. Made non-resident Fellow. Died February 1st, 1866, aged 76
1877 Bermingham, Edward John
1864 *Bibbins, William Burr. Trustee, 1867–1871. Died January 16th, 1871, aged 46
1889 Biggs, Hermann Michael
1883 Billings, John Haskell
1871 Billington, Cornelius Evarts
1880 Birdsall, William Randolph
1889 Bissell, Joseph Biddleman
1872 *Blake, John Ellis. Died September 27th, 1880, aged 48
1847 *Blakeman, William Nelson. Trustee, 1853–1858. Resigned 1888. Died August 10th, 1890, aged 85
1847 *Bliss, James Cotton. Vice-president, 1850. Died July 31st, 1855, aged 64
1847 *Bliven, Jeremiah Parker. Resigned 1884. Died July 12th, 1887, aged 75
1847 *Blois, Samuel. Died October 19th, 1873
1871 Blume, Samuel. Resigned 1878
1857 Blumenthal, Mark
1848 *Bogert, Cornelius Robert. Died November 10th, 1877, aged 77
1886 Bogue, Edward Augustus
1884 Boldt, Hermann St. John
1847 *Bolton, Jackson. Assistant secretary, 1850, 1851; recording secretary, 1852; vice-president, 1856. Died February 16th, 1866, aged 51
1848 *Booraem, Augustus Clark. Died December 16th, 1871, aged 46
1885 Booth, James Arthur
1887 Born, Rudolph Otto
1880 Bosworth, Francke Huntington
1889 Bowles, Fred J.
1847 *Boyd, Thomas. Died March 18th, 1856, aged 83
1869 Bozeman, Nathan
1888 Bracklow, Emil Amandus
1876 Bradley, Edward
1891 Bradley, Elizabeth Neely
1886 Bradshaw, Laban Langstaff
1847 *Brady, Patrick J. Died October 23d, 1856, aged 42
1888 Brannan, John Winters
1880 Breakell, James Albert
1889 Brewer, George Emerson
1886 Brickelmaier, William Joseph
1890 Briddon, Charles Kelly
1887 Brill, Nathan Edwin

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1888 Bristol, Elias Le Roy Macomb
1891 Brockway, Fred John
1880 Bronson, Edward Bennet
1890 Brooks, George Frederick
1887 Brothers, Abram
1890 Brown, Charles Henry
1863 *Brown, David Tilden. Died September 4th, 1889, aged 67
1889 Brown, Dillon
1885 Brown, Frederic Tilden
1867 *Brown, James Livingston. Died February 4th, 1873, aged 41
1885 Brown, Sanger. Made non-resident Fellow 1890
1848 *Brown, William Kellogg. Died July 4th, 1879, aged 72
1886 Bruce, Charles Eli
1848 *Brueninghausen, Charles. Died August 20th, 1876, aged 67
1888 Brugman, Albert Ferdinand
1880 Brush, Edward Fletcher
1875 Bryant, Joseph Decatur
1887 *Buchler, Charles William. Died November 17th, 1891, aged 64
1847 *Buck, Gurdon. Corresponding secretary, 1848; vice-president, 1852, 1855, 1856, 1859. Died March 6th, 1877, aged 70
1888 Buckmaster, Augustus Harper
1855 *Budd, Charles Amos. Died May 17th, 1877, aged 43
1889 Buffum, Charles Thomas
1847 *Bulkley, Henry Daggett. Vice-president, 1862, 1867; president, 1869, 1870. Died January 4th, 1872, aged 68
1874 Bulkley, Lucius Duncan
1880 Bull, Charles Stedman
1880 Bull, William Tillinghast
1879 Bullard, William Ebenezer
1887 Bullard, William Merrill
1848 *Bullus, Edward. Died September 25th, 1854, aged 50
1856 *Bumstead, Freeman Josiah. Died November 28th, 1880, aged 53
1887 Burch, Thomas Hamilton
1879 Burchard, Thomas Herring
1861 *Burke, John. Died September 8th, 1886, aged 59
1886 Burke, Martin
1890 Burnett, William Johnson
1865 Burrall, Frederick Augustus
1886 Burt, Stephen Smith
1877 Butler, George Henry. Resigned 1891
1854 Byrne, John

1891 Cabot, John
1885 Caillé, Augustus
1881 Caldwell, Robert Alexander
1888 Callan, Peter Augustine
1880 Cameron, Edward Miller
1847 *Cameron, James. Died December 12th, 1851, aged 66
1888 Cammann, Donald Muhlenberg
1862 *Cammann, George Philip. Died February 14th, 1863, aged 58
1890 Campbell, Archibald Murray
1847 *Campbell, James. Died March 12th, 1853, aged 59
1891 Campbell, John Law
1847 Campbell, Nicholas Lafayette. Resigned 1849
1880 Campbell, Robert. Resigned 1891
1885 Campbell, William Cunningham
1890 Carey, George Francis
1890 Carlisle, Stuart Brown
1885 Carman, Albro Richard
1869 *Caro, Salvatore. Died April 30th, 1881, aged 58
1888 Carpenter, Elon Nathaniel
1880 *Carpenter, Wesley Mannen. Died January 7th, 1888, aged 49
1886 Carr, Walter Lester
1885 Carreau, Joseph Stanislas
1858 *Carrington, William Allan. Died July 17th, 1867, aged 37
1847 *Carter, Galen. Vice-president, 1849–1852; trustee, 1850–1854, 1856–1858. Died April 2d 1870, aged 75

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1879 Castle, Frederick Augustus. Treasurer for trustees, 1884–1890; trustee, 1891–1892
1884 Cauldwell, Charles Milbank
1887 Chadbourne, Edwin Ruthvin
1847 *Chalmers, Thomas Clark. Died June 4th, 1884, aged 73
1879 Chamberlain, George Washington
1862 *Chamberlain, William Mellen. Assistant secretary, 1864; recording secretary, 1865–1867. Died October 31st, 1887, aged 60
1879 Chambers, Porter Flewellen
1891 Chandler, Charles Frederic. Orator, 1891
1847 *Chapin, Edward Rockwell. Died December 7th, 1886, aged 65
1886 Chapin, Henry Dwight
1847 *Chapin, John R. Died June 23d, 1852, aged 41
1889 Chappell, Walter Franklin
1872 Chauveau, Jean Fresne
1891 Cheesman, Hobart
1847 *Cheesman, John Cummings. Died October 11th, 1862, aged 75
1871 *Cheesman, Timothy Matlack. Died July 7th, 1888, aged 63
1882 Cheesman, Jr., Timothy Matlack
1847 Chesebrough, Nicholas Hallam. Resigned 1848
1865 *Childs, Timothy. Died September 3d, 1865, aged 42
1856 *Church, Allen Serrel. Died October 24th, 1884, aged 61
1859 *Churchill, Charles W. Died October 27th, 1859
1890 Claiborne, John Herbert
1856 *Clark, Alonzo. Died September 13th, 1887, aged 80
1870 Clark, James Guyon. Made non-resident Fellow 1885
1847 *Clark, Peter Fleming. Resigned 1848. Died May 15th, 1875, aged 73
1885 Clark, William Brewster
1847 *Clarkson, Cornelius Vermeule. Died June 1st, 1877, aged 64
1889 Cleaveland, Trumbull Williams
1847 *Clements, James William Giffing. Died September 14th, 1882, aged 66
1879 Cleveland, Clement
1889 Clift, George Denison
1886 Coan, Titus Munson
1859 *Cochran, George. Died November 19th, 1872, aged 40
1847 *Cock, Thomas. Vice-president, 1847–1849; president, 1852. Resigned 1863. Died June 14th, 1869, aged 85
1847 Cock, Thomas Ferris. Resigned 1862
1886 *Cocks, David Clark. Died January 14th, 1890, aged 39
1885 Coe, Henry Clark
1891 Coggeshall, Henry
1890 Cohn, Felix
1891 Cole, Carter Stanard
1883 Collins, Stacy Budd
1890 Collyer, Herman Livingston
1891 Combes, Frank Charles
1854 *Conant, David Sloan. Died October 8th, 1865, aged 40
1886 Conant, George Seymour
1864 *Connolly, James J. Died June 18th, 1871, aged 36
1890 Conrad, Harry Bell
1887 Cook, Stephen Guernsey
1847 *Cooper, James Start. Died April 11th, 1867, aged 50
1884 Corning, James Leonard
1852 *Corson, John Wesley. Made non-resident Fellow 1863. Died June 2d, 1882, aged 68
1847 *Covel, John C. Died November 4th, 1860, aged 64
1876 Cowles, Edward Orson
1862 *Coxe, Henry George. Died May 29th, 1866, aged 47
1870 Crampton, Henry Edward
1849 Crane, James. Resigned 1885

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1847 *Crane, John Jacob. Died March 4th, 1890, aged 70
1889 Crary, George Waldo
1851 *Creveling, Abraham. Died April 28th, 1852, aged 39
1891 Crook, James King
1887 Currier, Andrew Fay
1887 Currier, Charles Gilman
1887 Curtis, Benjamin Farquhar
1886 Curtis, Henry Holbrook
1889 Cushier, Elizabeth Martha
1880 Cushman, William Floyd. Treasurer, 1883–1888; treasurer for the trustees, 1891, 1892
1880 *Cutter, George Rogers. Died February 11th, 1891, aged 50
1877 Cypert, John Reed

1891 Dallas, Alexander
1868 *Dalton, Edward Barry. Died May 13th, 1872, aged 37
1856 *Dalton, John Call. Orator, 1873; vice-president, 1874–1876. Died February 12th, 1889, aged 64
1886 Dana, Charles Loomis
1867 Dana, Samuel Wood
1890 Davis, Albert Austin
1847 *Davis, John. Died April, 1883, aged 82
1886 Dawbarn, Robert Hugh Mackay
1879 *Dawson, Benjamin Frederick. Died April 3d, 1888, aged 41
1879 De Garmo, William Burton
1847 *Delafield, Edward. Died February 13th, 1875, aged 81
1880 Delafield, Francis
1880 Delavan, David Bryson
1876 *De Luna, Abelardo Bellido. Died March 2d, 1883, aged 33
1890 Dench, Edward Bradford
1885 Denhard, Charles Edward
1879 Dennis, Frederic Sheppard
1880 Denslow, Le Grand Norton. Made non-resident Fellow 1884
1877 Derby, Richard Henry
1890 Dessar, Leonard Albert
1879 Dessau, Solomon Henry
1847 Detmold, William. Vice-president, 1853–1855; orator, 1856
1885 Devlin, Robert John
1888 Dew, James Harvie
1880 Dexter, Benjamin Franklin
1891 Deynard, Adalbert Britton
1891 Dickinson, Robert Latou
1880 Dieffenbach, Richard Georg Ludwig
1890 Dillingham, Frederic Henry
1888 Dimock, Thomas
1884 Dixon, George Arthur
1887 D'Oench, Frederick Ernest
1885 Dold, William Elliott
1860 *Donaghe, William Rice. Died July 18th, 1866, aged 36
1883 *Donnelly, Michael. Died April 10th, 1890, aged 54
1888 Dorning, John
1856 Douglas, Jonathan Hancock
1886 Douglas, Orlando Benajah. Treasurer, 1889–1892
1848 *Douglas, Robert. Died July 25th, 1861, aged 47
1891 Douglas, Stuart
1890 Dowd, Charles North
1847 *Downs, Henry S. Died May 2d, 1879, aged 67
1847 *Drake, Benjamin. Corresponding secretary, 1847. Died January 11th, 1871, aged 65
1884 *Drake, Frederick Richard Seward. Died March 9th, 1888, aged 42
1862 *Draper, John William. Orator, 1863. Made non-resident Fellow 1874. Died January 4th, 1882, aged 70
1858 Draper, William Henry. Orator, 1886; vice-president, 1887–1889
1887 Dudley, Augustus Palmer
1847 *Dudley, William Henry. Died October 9th, 1886, aged 74
1880 Duncan, William Freese

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1867 *Dunster, Edward Swift. Orator, 1872. Made non-resident Fellow 1873. Died May 3d, 1888, aged 54
1877 Durant, Ghislani
1847 *Dwight, William White. Died July 11th, 1861, aged 54
1848 *Eadie, William Glass. Died July 6th, 1870, aged 59
1847 *Earle, Edward. Died August 21st, 1849, aged 37
1889 Edebohls, George Michael
1878 Eden, John Herman
1890 Edgar, James Clifton
1890 Ehrhart, Paul
1891 Einhorn, Max
1851 *Elder, Alexander. Died February 3d, 1875, aged 70
1858 Eliot, Ellsworth
1858 *Elliot, George Thomson. Died January 29th, 1871, aged 43
1886 Elliott, George Robert
1870 *Ellis, Henry Ashfield. Died January 25th, 1876, aged 41
1847 *Ellis, Samuel C. Died July 20th, 1874, aged 71
1862 *Elsberg, Louis. Died February 19th, 1885, aged 48
1889 Ely, William Smith
1880 Emerson, John Haven
1886 Emmet, Bache McEvers
1856 Emmet, Thomas Addis
1847 *Enos, De Witt Clinton. Died December 14th, 1868, aged 48
1891 Estabrook, Edward Leicester
1889 Evans, George Alfred
1888 Ewing, William Alexander

1887 Fairbairn, Henry Arnold
1883 Fanning, Warren Augustus
1864 *Farnham, Horace Putnam. Treasurer, 1877–1882; vice-president, 1883–1885; benefactor, 1884. Died June 9th, 1886, aged 63
1878 Farrington, Joseph Oakley
1885 Farrington, William Howard
1889 Ferguson, James Francis
1847 *Ferguson, John T. Died October 11th, 1859, aged 55
1887 Ferrer, José Maria
1891 Ferris, Albert Warren
1847 *Ferris, Floyd Thomas. Died November 6th, 1852, aged 62
1865 Field, Henry Martyn. Made non-resident Fellow 1871
1889 Field, Matthew Dickinson
1855 *Finnell, Thomas Constantine. Died April 9th, 1890, aged 64
1890 Fischer, Louis
1886 Fisher, Edward Dix
1857 Fisher, George Jackson. Resigned 1860
1847 *Fisk, Lyman. Died August 1st, 1859, aged 36
1847 *Fitch, James D. Died July 19th, 1881, aged 71
1879 Fleming, Martin Joseph
1862 *Flint, Austin. Orator, 1868; vice-president, 1871, 1872; president, 1873, 1874. Resigned 1886. Died March 13th, 1886, aged 73
1862 Flint, Jr., Austin. Resigned 1885
1891 Foerster, Francis
1889 Ford, Willis Ellard
1891 Fordyce, John Addison
1882 Forest, William Edward
1847 *Forrester, James Calvin. Died August 20th, 1881, aged 70
1870 Foster, Frank Pierce
1890 Foster, George Vickery
1847 *Foster, Joel. vice-president, 1859–1861; trustee, 1862–1866. Died June 29th, 1884, aged 82
1847 *Foster, Samuel Conant. Corresponding secretary, 1853, 1854; recording secretary, 1855, 1856; vice-president, 1858, 1859; orator, 1861, 1862. Died April 18th, 1873, aged 55
1887 Fowler, Edward Payson
1874 Fowler, George Bingham
1886 Fowler, George Ryerson

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1881 Fox, George Henry
1856 *Foy, Michael Eyre. Died June 9th, 1861, aged 37
1847 *Francis, John Wakefield. Vice-president, 1847; orator, 1847; president, 1848, 1855. Died February 8th, 1861, aged 72
1863 *Francis, Samuel Ward. Made non-resident Fellow 1880. Died March 25th, 1886, aged 50
1871 Frankel, Edward
1886 Frauenstein, Gustav
1880 Frazer, Gordon
1885 Freeborn, George Cornell
1890 French, Sarah Angie
1886 French, Thomas Rushmore
1889 Freudenthal, William
1886 Fridenberg, Albert Henry
1886 Fridenberg, Edward
1884 Friedman, Alfred
1887 Froehlich, David
1870 *Frothingham, William. Died November 19th, 1885, aged 54
1879 Fruitnight, John Henry
1888 Fuhs, Jacob
1889 Fuller, Eugene
1871 Fuller, Robert Mason
1885 Fuller, Stephen Edward
1865 Furman, Guido

1869 Gallatin, Albert Horatio. Resigned 1876
1889 Garmany, Jasper Jewett
1879 Garrigues, Henry Jacques
1847 *Garrish, John Pool. Died April 1st, 1891, aged 80
1870 *Gay, Harvey Stafford. Resigned 1878. Died March 25th, 1891, aged 65
1886 Gerster, Arpad Geyza
1848 *Gescheidt, Anthony. Died August 20th, 1877, aged 68
1877 Gibney, Virgil Pendleton
1863 Gilfillan, William
1847 *Gilford, Jacob Townsend. Died December 27th, 1868, aged 63
1877 Gillette, Walter Robarts
1889 Gilliam, William Clement
1847 *Gilman, Chandler Robbins. Resigned 1855. Died September 26th, 1864, aged 62
1887 Girdner, John Harvey
1879 *Glazier, William Cummings Warren. Died December 12th, 1880
1885 Gleitsmann, Joseph William
1885 Glück, Samuel. Resigned 1891
1885 Goelet, Augustin Hardin
1887 Goffe, James Riddle
1891 Goldenberg, Herman
1881 Goldsmith, William Benjamin. Made non-resident Fellow 1881
1856 Gomez, Horatio. Resigned 1884
1882 Goodwillie, David Henderson
1881 Gorton, Orren Augustus
1889 Gottheil, William Samuel
1856 Gouley, John William Severin. Resigned 1885
1847 *Graham, John. Died May 20th, 1847, aged 47
1885 Grandin, Egbert Henry
1891 Granger, William Davis
1889 Grauer, Frank
1885 Gray, Landon Carter
1848 *Green, David. Died October 18th, 1856, aged 60
1847 *Green, Horace. Died November 29th, 1866, aged 63
1847 *Greene, Isaac. Died July 3d, 1854, aged 38
1854 Greene, John Winantz. Assistant secretary, 1854, 1855; corresponding secretary, 1856–1859. Resigned 1867
1891 Greene, Robert Holmes
1890 Greene, William Frank
1847 *Griscom, John Hoskins. Vice-president, 1854; orator, 1854; trustee, 1850, 1856–1858; statistical secretary, 1863. Died April 28th, 1874, aged 64
1883 *Griswold, Gaspar. Died March 4th, 1886, aged 28
1872 Griswold, Henry

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1885 Gruening, Emil
1885 Grunhut, Bernhard
1847 *Guernsey, Peter Bennett. Died November 26th, 1873, aged 69
1890 Guiteras, Ramon
1847 *Gunn, Alexander N. Died December 21st, 1871, aged 62

1880 Habirshaw, John
1867 Hackley, Charles Elihu. Resigned 1879
1875 Hadden, Alexander
1847 Hall, Edwards
1884 Hall, Richard John. Resigned 1891
1847 Hall, Samuel. Resigned 1878
1875 Hall, William Hunt
1891 Hallock, Silas Farnsworth
1891 Halsey, Frank Spencer
1847 *Halsted, Jonathan. Died April 10th, 1856, aged 46
1873 Hamilton, Allan McLane. Statistical secretary, 1874–1877
1864 *Hamilton, Frank Hastings. Vice-president, 1880–82. Died August 11th, 1886, aged 74
1885 Hammond, Graeme Monroe
1887 Hance, Irwin Howell
1874 Hanks, Horace Tracy. Assistant secretary, 1874–1876; recording secretary, 1877–1879; vice-president, 1882–1884
1881 *Hardy, William Lewis. Died April 24th, 1886, aged 36
1857 *Harris, Elisha. Died January 31st, 1884, aged 60
1891 Harrison, Daniel Augustus
1879 Harrison, George Tucker
1859 *Harsen, Jacob. Trustee, 1862–1866. Died December 31st, 1862, aged 54
1880 Hart, George. Made non-resident Fellow 1882
1847 *Hart, John. Died August 9th, 1867, aged 57
1879 *Hartt, Henry LeBaron. Died February 20th, 1880, aged 38
1877 *Harwood, Edward Coke. Died January 13th, 1891, aged 52
1888 Hayden, James Raynor
1887 Hays, George Dalton
1865 *Hazlett, John. Died March 4th, 1870, aged 53
1882 *Healy, Thomas Francis. Died February 18th, 1889, aged 38
1865 *Hedges, David A. Resigned 1881. Died January 1st, 1887, aged 51
1880 Heineman, Henry Newton
1883 Heitzmann, Charles
1891 Heitzmann, Louis
1882 Henna, Joseph Julio
1871 Henry, Morris Henry
1847 *Henschel, Charles. Died September 18th, 1872, aged 63
1847 Hepburn, James Curtiss. Made non-resident Fellow 1863
1887 Hepburn, Neil Jamieson
1888 Heppenheimer, Frederick Charles
1889 Hermance, Edgar Martindale
1867 Herrick, Everett. Trustee, 1882–1892
1889 Herter, Christian Archibald
1857 *Herzog, Max. Died April 12th 1880, aged 49
1889 Heuel, Emil
1889 Heuel, Franz
1863 *Hewit, Henry Stuart. Died August 19th, 1873, aged 47
1856 Heywood, Charles Frederick. Recording secretary, 1857, 1858
1879 Hickok, George Benedict
1887 Hillis, Thomas John
1879 Hills, John Marshall. Resigned 1882
1856 Hinton, John Henry. Recording secretary, 1861–1864
1890 Hirons, Joseph Gardner
1854 *Hirsch, Simon. Died April 23d, 1878, aged 61
1880 Hitchcock, Urban Gillespie
1847 *Hobart, William Henry. Died January 21st, 1857, aged 53
1891 Hodenpyl, Eugene

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1878 Hodgman, Abbott
1847 *Hogan, Daniel M. Died 1849
1871 Hogan, Edward J.
1867 *Hogan, Michael. Died December 18th, 1882, aged 61
1889 Holgate, Thomas Hopkinson
1883 Holt, Luther Emmett
1887 Honegger, Oscar Peter
1884 Hopkins, George Gallagher
1891 Hopkins, John Louis
1891 Hopkins, James Swinburne
1847 *Horsfield, Thomas W. Died February 19th, 1868, aged 64
1889 Hosmer, George W.
1866 Howard, Benjamin. Made non-resident Fellow 1881
1872 *Howe, Joseph William. Died June 8th, 1890, aged 45
1889 Howe, Robert Thomas
1890 Howell, John Taylor
1891 Hubbard, Dwight L.
1891 Hubbard, George Elisha
1847 Hubbard, Samuel Thomas. Corresponding secretary, 1853–1858; vice-president, 1873–1876; trustee, 1859, 1863–1872, 1881–1885
1885 Huber, Francis
1874 *Hudson, Erasmus Darwin. Orator, 1875; librarian, 1883. Died May 9th, 1887, aged 43
1866 Hull, Joseph Janney
1888 Hume, William Alexander
1867 Humphreys, George Hoppin
1889 Hunt, Joseph Hill
1849 *Hunter, Abraham Thew. Died August 1st, 1849, aged 52
1878 Hunter, Alexander Stuart
1891 Hunter, Charles
1891 Hunter, Dwight Williams
1879 *Hunter, James Bradbridge. Died June 10th, 1889, aged 52
1885 *Hunter, William Charles. Died September 20th, 1885, aged 55
1879 Hustace, Francis. Resigned 1891
1856 *Husted, Nathaniel Clark. Died November 19th, 1891, aged 66
1847 *Hutchinson, Eugene F. Died March 2d, 1848, aged 24
1857 *Hutchison, Joseph Chrisman. Vice-president, 1869–1871. Resigned 1885. Died July 17th, 1887, aged 59
1880 Hutton, Allan Clark. Made non-resident Fellow 1885
1882 Hyde, Frederick Erastus
1848* Hyslop, James. Died May 17th, 1870, aged 53

1889 Irwin, John Arthur
1850 *Isaacs, Charles Edward. Vice-president, 1858. Died June 16th, 1860, aged 48
1883 Isham, John Beach. Resigned 1890
1875 Ives, Frank Linsly
1847 *Ives, George Whitefield. Died December 6th, 1874, aged 55

1886 Jackson, Frank Watson
1880 Jackson, George Follansbee
1884 Jackson, George Thomas
1847 Jackson, William Henry
1857 Jacobi, Abraham. President, 1885–1888; trustee, 1889–1892
1880 Jacobi, Mary Putnam
1891 Jacobson, Nathan
1879 Jacobus, Arthur Middleton. Assistant secretary, 1883–1885; recording secretary, 1886–1891
1885 Jacoby, George Washington
1889 James, Walter Belknap
1853 Janes, Edward Houghton. Assistant secretary, 1865–1867; recording secretary, 1868–1870
1879 Janeway, Edward G.
1867 Janvrin, Joseph Edward
1891 Jarman, George Wallace
1884 Jarvis, William Chapman
1852 *Jenkins, John Foster. Assistant secretary, 1853. Died October 9th, 1882, aged 56
1882 Jewett, Charles
1882 Johnson, John George

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1875 Johnson, Laurence. Librarian, 1877–1882; trustee, 1889–1892
1855 *Johnson, William J. Died September 22d, 1860, aged 55
1884 *Johnson, Woolsey. Died June 21st, 1887, aged 45
1847 *Johnston, Francis Upton. Vice-president, 1847. Died January 7th, 1858, aged 61
1856 Johnston, Jr., Francis Upton. Assistant secretary, 1857–1860
1852 *Jones, Alanson Sylvester. Died May 20th, 1881, aged 61
1885 Jones, Charles Noah Dixon
1856 *Jones, Eusebius Lee. Died January 30th, 1876, aged 46
1889 Jones, Israel Cone
1886 Jones, Samuel Seabury
1847 *Jones, William Ap-William. Died July 11th, 1891, aged 78
1872 Judson, Adoniram Brown. Statistical secretary, 1886–1892
1883 Judson, Champion Hiram
1883 Judson, Edward Allen. Resigned 1885
1889 Junor, Kenneth Frank

1891 Kakeles, Moses Seligman
1882 Kalish, Richard. Assistant secretary, 1886–1891; recording secretary, 1892
1890 Kammerer, Frederic Joseph
1857 *Kammerer, Joseph. Died June 10th, 1875, aged 53
1876 Katzenbach, William Henry. Assistant secretary, 1880–1882; recording secretary, 1883–1885
1847 *Kearney, Ravaud. Died March 21st, 1849, aged 26
1888 Kearney, Thomas John
1878 Kellogg, Theodore Harvey
1891 Kelly, James Edward
1890 Kelsey, Charles Boyd
1880 Kemp, William Mitchell
1847 *Kennedy, James. Died March 29th, 1884, aged 84
1863 *Kerrigan, Joseph Ambrose. Died January 17th, 1879, aged 46
1878 Kershner, Edward
1880 Ketch, Samuel
1882 Keyes, Edward Lawrence. Orator, 1890; vice-president, 1891, 1892
1847 *Kilbourne, Jedediah Sage. Died June 12th, 1877, aged 71
1889 Kimball, Reuel Baker
1854 *Kimbark, Everett Hoffman. Died August 29th, 1872, aged 55
1851 *Kingsbury, George H. Died May 4th, 1852, aged 31
1880 Kinnicutt, Frank Parker
1847 *Kissam, Richard Sharp. Trustee, 1853–1861. Died November 28th, 1861, aged 53
1888 Kitchen, Joseph Moses Ward
1886 Knapp, Gideon Lee
1874 Knapp, Herman
1889 Knapp, John Beach
1876 *Knight, James. Died October 24th, 1887, aged 76
1880 Knight, Charles Huntoon
1889 Knipe, George
1887 Kohn, Samuel
1888 Koplik, Henry
1854 *Krackowizer, Ernst. Died September 23d, 1875, aged 53
1887 Kremer, Carl Fridrich
1885 *Kretzschmar, Paul Henry. Died April 29th, 1891, aged 43
1888 Kretzschmar, William Henry
1891 Krollpfeiffer, Henry
1890 Krug, Florian

1891 Ladinski, Louis Julius
1885 Lambert, Edward Wilberforce
1891 Lambert, Samuel Waldron
1880 Langman, Gustave
1890 Latham, James Ryder
1865 *Lawrence, Jonathan Samuel. Died July 10th, 1884, aged 76

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1869 Leale, Charles Augustus
1854 Leaming, James Rosebrugh
1889 Le Boutillier, William Guitton
1847 *Lee, Charles Alfred. Made non-resident Fellow. Died February 14th, 1872, aged 71
1847 Lee, James C. Made non-resident Fellow 1855
1869 Lee, Charles Carroll. Vice-president, 1885–1887
1889 Le Fèvre, Egbert
1874 Lefferts, George Morewood
1872 Leo, Simeon Newton
1886 Leonard, George William
1890 Leonard, William Robert
1850 *Leo-Wolf, George. Died March 14th, 1855, aged 40
1847 *Leo-Wolf, Morris. Died August 3d, 1887, aged 84
1889 Lesser, Adolph Monæ
1887 Leszynsky, William M.
1851 *Leveridge, Benjamin C. Died April 16th, 1862, aged 63
1890 Leviseur, Frederic Jacob
1891 Lewis, Charles Henry
1880 Lewis, Daniel
1869 *Lewis, William Beale. Made non-resident Fellow 1873. Died June 16th, 1874, aged 32
1866 *Lidell, John A. Died July 10th, 1883, aged 59
1886 Lilienthal, Frederick William
1891 Lilienthal, Howard
1879 Lincoln, Rufus Pratt
1886 Lindley, Charles Lutellus
1847 *Linsly, Jared. Trustee, 1865–1869. Died July 12th, 1887, aged 83
1864 *Little, James Lawrence. Died April 4th, 1885, aged 48
1882 *Livingston, Beverley. Died June 30th, 1883, aged 31
1855 Livingston, Watts Cady
1891 Lloyd, Samuel
1891 Locke, Hersey Goodwin
1876 Lockrow, Arthur Van Buren
1886 Lockwood, Charles Edward
1888 Lockwood, George Roe
1861 *Loines, Jonas Powell. Died December 15th, 1873, aged 52
1863 Loomis, Alfred Lee. Trustee, 1885–1888; president, 1889–1892
1889 Loomis, Henry Patterson
1869 *Loring, Edward Greely. Died April 23d, 1888, aged 48
1847 *Ludlow, Edward Greenfield. Resigned 1869. Died July 7th, 1877, aged 84
1876 Ludlum, William Simmons
1871 Lusk, William Thomson
1874 Lynch, Patrick Joseph
1847 *Lyon, James Ludlow. Died December 24th, 1858, aged 50
1887 Lyon, Samuel Kuypers
1882 Lyons, Frederick Augustus

1857 *McAllister, George. Died July 29th, 1864, aged 37
1880 *McBride, Thomas Alexander. Died August 31st, 1886, aged 40
1889 McBurney, Charles
1866 *McClellan, Christopher Raborg. Resigned 1884. Died January 13th, 1887, aged 73
1847 *McClelland, John. Died February 20th, 1875, aged 70
1887 McCorkle, John Alva
1886 McCosh, Andrew James
1885 McCreery, John Alexander
1882 McDonald, Alexander Edward
1889 *McDonald, Frank Hewitt. Died August 2d, 1890, aged 46
1887 Macdonald, George Alexander
1847 *McDonald, James. Died May 5th, 1849, aged 45
1867 McDonnell, Patrick William. Resigned 1873
1888 McGillicuddy, Timothy Joseph
1891 McGinnis, Edward L'Hommedieu
1864 MacGregor, James Robinson
1886 McIntyre, Burnett Clinton
1889 McKay, William

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1885 McKim, William Duncan
1876 McLane, James Woods
1880 McLaury, William Muir
1882 McLean, Malcolm
1857 McLeod, Samuel Brown Wylie
1886 McMahon, John Bernard
1884 McMaster, Nathaniel G. Mohr
1888 McNaughton, George
1847 *MacNeven, William Hugh. Died May 12th, 1854, aged 38
1848 McNulty, John. Resigned 1869
1888 McNutt, Sarah Jane
1887 Mandeville, Henry Addison
1847 *Manley, James Robert. Orator, 1849; vice-president, 1849. Died November 21st, 1851, aged 70
1889 Manley, Thomas Henry
1876 Mann, Matthew Darbyshire. Made non-resident Fellow 1881
1884 Markoe, Francis Hartman
1891 Markoe, James Wright
1847 Markoe, Thomas Masters
1847 *Martin, Joseph. Died April 26th, 1864, aged 67
1872 Martin, Theodore Dwight. Resigned 1891
1847 *Marvin, David D. Died October 21st, 1852, aged 40
1882 Mason, Lewis Duncan
1889 Mason, Rufus Osgood
1877 *Mason, Theodore Lewis. Died February 12th, 1882, aged 79
1885 Maxwell, Elijah Ashton
1847 *Maxwell, William Henry. Resigned 1885. Died July 16th, 1888, aged 75
1891 May, Calvin Sloane
1886 May, Charles Henry
1885 Mayer, Abraham
1888 Maynard, Alfred Walter
1847 *Meikleham, David S. Died November 20th, 1849, aged 45
1884 Mendelson, Walter
1887 Merriam, Frank Warren
1878 Merrill, John Nelson. Made non-resident Fellow 1881
1854 Merritt, Joseph King. Made non-resident Fellow 1867
1874 Metcalfe, Francis Johnston. Made non-resident Fellow 1877
1847 Metcalfe, John Thomas. Made honorary Fellow 1885
1885 Meyer, Alfred
1888 Meyer, Willy
1888 Milbank, Robert
1879 *Milhau, John Jefferson. Died May 8th, 1891, aged 63
1887 Millard, Henry Benton
1890 Miller, Elmer Albertus
1848 *Miller, John. Died January 13th, 1863, aged 56
1848 *Miller, William Ellison. Died January 16th, 1852, aged 52
1879 Milne, Charles
1848 *Miner, William. Died November 16th, 1859, aged 45
1847 *Miner, William W. Vice-president, 1848. Died March 20th, 1863, aged 83
1849 *Minor, James Monroe. Resigned 1867. Died March 23d, 1879, aged 64
1887 Minor, John Crannell
1880 Miranda, Ramon Luis
1847 *Mitchell, Chauncey Leeds. Died May 8th, 1888, aged 74
1885 Mitchell, Hubbard Winslow
1886 Mittendorf, William Frederick
1885 Moeller, Henry
1891 Moffat, Henry
1852 Monell, Joseph Augustus
1871 *Monell, Joseph Sayer. Died March 7th, 1881, aged 52
1848 *Moore, Samuel W. Died August 26th, 1854, aged 67
1885 Moore, William Oliver
1849 *Moran, Thomas. Died 1853
1887 Morje, Benjamin
1890 Morris, Lewis Rutherford
1847 Morris, Richard Lewis. Resigned 1868
1891 Morris, Robert Tuttle
1870 Morris, Stuyvesant Fish

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1880 Morrow, Prince Albert
1891 Mortimer, William Golden
1881 Morton, William James
1874 *Mosher, Jacob Simmons. Made non-resident Fellow 1881. Died August 13th, 1883, aged 49
1847 *Mott, Valentine. President, 1849, 1857. Died April 26th, 1865, aged 79
1882 Mourraille, Gustave
1875 Mundé, Paul Fortunatus. Corresponding secretary, 1885
1882 Munn, John Pixley
1884 *Murray, Charles Pemberton. Died May 5th, 1890, aged 34
1889 Murray, Francis Wisner
1885 Murray, Robert Alexander
1890 Myers, Thaddeus Halsted
1889 Myles, Robert Cunningham

1884 Nammack, Charles Edward
1889 Needham, George Gordon
1871 Neftel, William Basil
1848 *Neilson, John. Died June 19th, 1857, aged 82
1855 *Nelson, James Barnes. Died September 28th, 1874, aged 61
1874 *Nesmith, Robert Dillon. Died December 23d, 1880, aged 40
1887 Neufield, Albert William
1889 Newcomb, Albert Simon
1879 *Newcomb, Gilbert Leroy. Died June, 1885, aged 46
1891 Newcomb, James Edward
1880 *Nichols, Charles Henry. Died December 16th, 1889, aged 69
1847 *Nichols, Elias S. Died November 5th, 1880, aged 78
1889 Nichols, James Allen
1889 Nichols, James Ephraim
1859 Nichols, Truman
1873 Nicoll, Henry Denton
1886 Nilsen, Jonas Rein
1885 Noble, John Gould
1861 Noeggerath, Emil. Made corresponding Fellow 1886
1888 Norris, Henry Selden
1864 North, Nelson Luther. Made non-resident Fellow 1869
1887 Northrup, William Perry
1871 *Nott, Josiah Clark. Died March 31st, 1873, aged 69
1862 Noyes, Henry Drury. Orator, 1885; vice-president, 1886–1888

1885 O'Dwyer, Joseph
1885 Offenbach, Robert
1847 *Ogden, Benjamin. Trustee, 1853–1858, 1861. Died June 18th, 1867, aged 70
1884 Olds, Frank Williams
1888 Oppenheimer, Henry Simon
1891 Oppenheimer, Isaac
1862 Ordronaux, John. Orator, 1866. Made non-resident Fellow 1879
1873 Orton, Samuel Henry
1857 *O'Reilly, John. Died December 6th, 1868, aged 55
1861 O'Sullivan, Richard J. Resigned 1884
1861 Otis, Fessenden Nott. Assistant secretary, 1862, 1863
1891 Otis, William K.

1871 Packard, Charles William
1881 Page, Richard Channing Moore. Vice-president, 1890–1892
1864 *Paine, Martyn. Died November 10th, 1877, aged 82
1869 Pardee, Charles Inslee
1873 *Parigot, Julius. Died September 30th, 1877, aged 71
1889 Park, Roswell
1847 *Parker, Willard. Trustee, 1850–1852; vice-president, 1853; president, 1856. Died April 25th, 1884, aged 83
1874 Parker, Jr., Willard
1847 *Parkinson, William B. Died May 11th, 1856, aged 45
1889 Parsons, John
1890 Parsons, Ralph Lyman
1878 Partridge, Edward Lasell

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1891 Patterson, Frank Newhall
1847 *Paul, James C. Died May 5th, 1859
1884 Peabody, George Livingston
1891 Pease, Daniel P.
1858 *Peaslee, Edmund Randolph. Orator, 1858; vice-president, 1868–1870; president, 1871, 1872; trustee, 1873–1878. Died January 21st, 1878, aged 63
1878 Peaslee, Edward Henry
1886 Peck, Edward Sprague
1886 Peckham, Grace
1885 Peirce, Henry Thompson
1847 *Pennell, Richard. Died April 11th, 1861, aged 62
1847 *Percy, Samuel Rotton. Resigned 1868. Died April 24th, 1890, aged 73
1879 Perry, James Leonard
1880 Perry, John Gardner
1850 Peters, George Absalom. Assistant secretary, 1852; trustee, 1886–1890
1870 Peters, John Charles
1889 Peterson, Frederick
1874 *Peugnet, Eugene Emile Ramsay. Died October 10th, 1879, aged 42
1891 Pfeiffer, Alfred Gustave
1888 Phelps, Abel Mix
1891 Phelps, Charles
1847 *Phillips, Samuel B. Died March 3d, 1857, aged 54
1886 Phillips, Wendell Christopher
1847 *Piatt, William F. Died 1850, aged 42
1875 Piffard, Henry Granger
1867 *Pinkney, Howard. Died May 14th, 1888, aged 51
1889 *Pinkney, Wiliam Henry. Died May 2d, 1889, aged 26
1873 Polk, William Mecklenberg. Orator, 1889
1891 Pollitzer, Sigismund
1865 Pomeroy, Oren Day
1847 *Pond, James Otis. Treasurer, 1848–1876. Died February 1st, 1881, aged 90
1869 Pooley, Thomas Rickett
1880 Poore, Charles Talbot
1888 Pope, Alexander Barnett
1856 *Porter, Mortimer Gardner. Died November 24th, 1863,
1880 Porter, Peter Brynberg
1891 Porter, William Henry
1847 *Post, Alfred Charles. Orator, 1849; vice-president, 1850, 1861–1866; president, 1867, 1868. Died January 7th, 1886, aged 80
1870 *Post, William Henry Beers. Assistant secretary, 1871–1873. Resigned 1886. Died November 4th, 1886, aged 43
1881 Powell, Seneca Daniel
1847 *Power, William. Died September 14th, 1858, aged 60
1887 Powers, Charles Andrew
1847 *Pratt, Peter. Died December, 1860, aged 52
1880 Pratt, Henry Rice. Made non-resident Fellow 1886
1887 Prout, Jonathan Slater
1886 Prudden, Theophile Mitchell
1890 Pryor, William Rice
1847 *Punnett, John. Resigned 1860
1871 Purdy, Alfred Edgar Martindale
47 *Purdy, Alfred Seaman. Died July 22d, 1886, aged 75
1847 *Purdy, Samuel Augustus. Recording secretary, 1853, 1854. Died January 12th, 1888, aged 75
1847 Purple, Samuel Smith. Statistical secretary, 1863–1868; vice-president, 1872–1874; president, 1875–1878; trustee, 1879–1883; benefactor, 1887
1879 Putzel, Leopold

1876* Quackenbos, Henry Feltus. Died August 21st, 1888, aged 68

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1884 Quackenbos, John Duncan
1889 Quimby, Charles Elihu
1889 Quinlan, Francis Joseph
1891 Quintard, Edward

1876 *Raborg, Samuel Aloyseious. Died January 4th, 1888, aged 45
1888 Rachel, George William
1875 Ramsdell, Edwin Dickinson
1851 *Randolph, Israel. Died June 2d, 1877, aged 76
1880 Ranney, Ambrose Loomis
1891 Ranney, Frederick Merrill
1863 *Ranney, Henry Davis. Resigned 1877. Died January 12th, 1879, aged 61
1851 *Ranney, Moses Harris. Died December 7th, 1864, aged 50
1887 *Ranney, Walter Lafayette. Died August 17th, 1888, aged 29
1856 *Raphael, Benjamin I. Died March 17th, 1880, aged 61
1889 Rau, Leonard Sigmund
1859 *Ray, Robert. Died July 3d, 1860, aged 27
1879 Read, Ira B.
1849 *Reese, David Meredith. Died May 13th, 1861, aged 60
1880 Reid, John Joseph
1879 *Reid, Kenneth. Died January 22d, 1882, aged 42
1872 *Reinfelder, Maximilian Joseph. Died November 30th, 1888, aged 67
1866 *Reynolds, James Banks. Died August 18th, 1882, aged 48
1886 Rhein, Meyer Louis
1891 Rhoades, Archibald Craig
1887 Rice, Clarence Charles
1855 Richards, Joseph William. Died September 6th, 1886, aged 86
1886 Richards, Montrose Reuben
1890 Richardson, Charles Henry
1888 Ridlon, John
1887 Riley, Frederick Coe
1885 Ring, Frank Whitman
1885 Ripley, John Howard

1874 Robert, Charles Smith. Resigned 1880
1883 Roberts, Milton Josiah
1874 Roberts, Nathan Selleck
1847 *Roberts, William Currie. Corresponding secretary, 1847–1852, 1868–1870; vice-president, 1870–1873. Died December 9th, 1873, aged 64
1847 *Robeson, Abel Bellows. Died March 22d, 1853, aged 36
1872 Robie, John Wilson. Resigned 1881
1881 Robinson, Andrew Rose
1876 Robinson, Beverley
1888 Rochester, Thomas Moore
1869 Rockwell, Alphonso David
1847 *Rockwell, William. Trustee, 1853–1855. Died December 30th, 1867, aged 67
1873 *Rodenstein, Charles Frederick. Died March 18th, 1876, aged 49
1862 Rodenstein, Louis Augustus
1847 *Rodgers, John Kearny. Vice-president, 1848–1851; trustee, 1850–1851. Died November 9th, 1851, aged 59
1847 *Rogers, John Smyth. Died March 27th, 1851, aged 58
1886 Rogers, Willard Hall
1872 Roof, Stephen White
1865 Roosa, Daniel Bennett St. John. Orator, 1874, 1888; vice-president, 1889–1891
1887 Roosevelt, James West
1862 Rosenberg, Emil. Resigned 1880
1880 Rowe, Alvah
1885 Rudisch, Julius
1887 Rupp, Adolph

1847 Sabine, Gustavus Adolphus
1874 *Sabine, Thomas Taunton. Died August 23d, 1888, aged 46
1887 Sachs, Bernard
1876 St. John, Samuel Benedict. Made non-resident Fellow 1878

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1888 Sanders, Joseph Anthony
1861 *Sands, Austin Ledyard. Made non-resident Fellow. Died December 2d, 1877, aged 52
1858 *Sands, Henry Berton. Resigned 1861. Died November 18th, 1888, aged 58
1888 Sass, Luis Francisco
1873 Satterlee, Frank Le Roy
1864 *Satterlee, Richard Smith. Died October 10th, 1880, aged 82
1882 Satterthwaite, Thomas Edward
1847 Sayre, Lewis Albert
1882 *Sayre, Lewis Hall. Died January 10th, 1890, aged 38
1887 Sayre, Reginald Hall
1891 Schapringer, Aloysius
1885 Scharlau, Barnim
1886 Scheider, Julius. Resigned 1891
1852 *Schilling, Ernest. Died April 25th, 1872, aged 62
1847 *Schirmer, William. Died July 8th, 1878, aged 70
1847 *Schmidt, John W. Died 1857, aged 50
1887 Schmitt, John
1882 Shoenemann, Charles Paul Rudolph
1873 *Schultze, Albert Ferdinand Louis. Died February 8th, 1887, aged 63
1882 *Schuyler, William David. Died December 31st, 1887, aged 53
1885 Schweig, Henry
1884 Scott, George
1883 Scudder, Charles Davies
1891 Seabrook, Harry H
1885 Seaman, Louis Livingston
1888 Seamans, William Shepard
1873 Seguin, Edward Constant
1885 Seibert, August
1870 Sell, Edward Herman Miller
1890 Sellew, Frederic Smith
1856 *Sewall, John Gallison. Died January 18th, 1872, aged 51
1879 Sexton, Samuel
1880 Shaffer, Newton Melman
1847 *Shanks, John. Died August 10th, 1870, aged 69
1888 Shaw, Eben Sturges Dewey
1862 *Sheppard, John William. Died October 5th, 1868, aged 46
1847 *Sherwood, Burritt. Died August 10th, 1854, aged 53
1884 Shirmer, George Philip
1862 Shrady, George Frederick
1879 Shrady, John
1891 Shunk, Albert
1880 Silver, Henry Mann
1887 Simmons, Charles Ezra
1891 Simpson, William Kelly
1884 Sims, Harry Marion
1856 *Sims, James Marion. Orator, 1857. Died November 13th, 1883, aged 69
1891 Skeel, Frank Denel
1879 Skene, Alexander Johnston Chalmers
1864 *Sloan, William James. Made non-resident Fellow 1873. Died March 17th, 1880, aged 65
1890 Small, John Wesley. Made non-resident Fellow 1891
1876 Smith, Abram Alexander
1877 Smith, Andrew Hermance. Orator, 1887; vice-president, 1888–1890
1847 *Smith, Charles Dickinson. Resigned 1868. Died December 4th, 1891, aged 77
1847 *Smith, David. Died January 17th, 1867, aged 57
1870 *Smith, David Augustine. Died April 9th, 1872, aged 28
1882 Smith, George De Forest
1847 *Smith, Gilbert. Died July 16th, 1851, aged 80
1858 Smith, Gouverneur Mather. Orator, 1869; vice-president, 1875–1877; trustee, 1878–1892
1853 *Smith, James Owen. Died January 3d, 1885, aged 82

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1867 *Smith, Jerome Candee. Made non-resident Fellow 1878. Died June 19th, 1888, aged 56
1847 *Smith, Joseph Mather. Orator, 1850; vice-president, 1850–1852; president, 1854; trustee, 1859. Died April 22d, 1866, aged 77
1856 Smith, Job Lewis
1866 Smith, Oscar Gilbert
1864 Smith, Samuel Hanbury
1883 Smith, Samuel Wesley
1855 Smith, Stephen. Orator, 1867
1870 *Snelling, Frederick Greenwood. Died November 26th, 1878, aged 47
1847 *Snowden, John. Died January 22d, 1848, aged 33
1890 Spalding, George Atherton
1888 Spannhake, Louis
1889 Speakman, Howard Draper
1864 Speir, Samuel Fleet
1891 Spencer, James Decker
1847 *Spring, Edward. Died February 13th, 1850, aged 42
1859 Squibb, Edward Robinson. Resigned 1880
1876 *Stanley, Claude Graham. Died May 23d, 1877, aged 30
1885 Starr, Moses Allen. Corresponding secretary, 1889–1892
1889 Stearns, Henry Schermerhorn
1847 *Stearns, John. President, 1847. Died March 18th, 1848, aged 78
1880 Stedman, Thomas Lathrop
1880 Stein, Alexander William
1869 *Stephenson, Marcus P. Resigned 1874. Died November 23d, 1885, aged 52
1847 *Stephenson, Mark. Died August 28th, 1865, aged 62
1847 *Stevens, Alexander Hodgdon. President, 1851. Died March 30th, 1869, aged 80
1885 Stevens, William
1891 Stewart, Douglas Hunt
1847 Stewart, Ferdinand Campbell. Recording secretary, 1847, 1848; orator, 1852; vice-president, 1853, 1855. Made corresponding Fellow
1847 *Stewart, James. Died September 12th, 1864, aged 65
1847 *Stickney, Josiah Dwight. Died September 30th, 1849, aged 32
1865 *Stiles, Richard Cresson. Died April 17th, 1873, aged 42
1887 Stimson, Charles Woodbury
1875 Stimson, Daniel MacMartin
1847 *Stimson, Edward Bolles. Assistant secretary, 1854. Died May 15th, 1858, aged 36
1887 Stimson, Lewis Atterbury
1865 *Stirling, Thomas Bruce. Died June 11th, 1877, aged 47
1889 Stoddard, Enoch Vine
1891 Stoechel, Gustav Mozart
1847 *Stone, John Osgood. Died June 7th, 1876, aged 63
1847 *Storer, Ebenezer. Died May 20th, 1879, aged 77
1890 Stowell, William Leland
1874 Strachan, Alexander Russell
1887 Stuart, Francis Hart
1887 Stubenbord, William
1880 Sturgis, Frederic Russell
1891 Suiter, Augustus Walter
1890 Swain, Fremont
1888 Swalm, William Francis
1859 Swan, Charles Young. Resigned 1868
1879 Swasey, John Higgins
1847 *Sweeney, Hugh. Died September 15th, 1857, aged 57
1851 *Sweeney, James. Died 1872
1847 *Swett, John Appleton. Died September 18th, 1854, aged 45
1889 Swift, Edwin Elisha
1866 *Swift, Foster. Died May 10th, 1875, aged 41
1890 Swift, George Montague
1856 *Swift, Heman Sedgwick. Died 1857, aged 30

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1876 Swift, Samuel
1889 Swift, William Jonathan
1891 Swinburne, George Knowles
1890 Swinburne, Ralph Erskine
1888 Syms, Parker

1847 *Taft, Marcus L. Assistant secretary, 1848. Died February 8th, 1850, aged 29
1872 *Tauszky, Rudolph. Died November 21st, 1889, aged 54
1867 Taylor, Charles Fayette
1886 Taylor, Henry Ling
1847 *Taylor, Isaac Ebenezer. Trustee, 1863, 1884; vice-president, 1867–1869; trustee, 1872–1881. Resigned 1887. Died October 30th, 1889, aged 77
1877 Taylor, James Ridley
1883 Taylor, Robert William
1862 *Teats, Sylvester. Died August 19th, 1887, aged 62
1865 *Teller, Seligmann. Died March 13th, 1885, aged 54
1848 *Tellkampf, Theodore August. Resigned 1881. Died September 7th, 1883, aged 71
1887 *Thallon, William Morrison. Died October 1st, 1888, aged 29
1847 *Thayer, Henry White. Died May 21st, 1857, aged 50
1859 *Thebaud, Julius Stephen. Died October 20th, 1876, aged 48
1857 Thomas, Theodore Gaillard. Recording secretary, 1859–1861; orator, 1877; vice-president, 1878–1880
1870 Thompson, Bradford Smith. Statistical secretary, 1873. Made non-resident Fellow 1874
1869 *Thompson, George. Died January 13th, 1877, aged 37
1885 Thompson, William Gilman
1864 Thomson, William Hanna. Orator, 1878
1880 Thurman, William
1891 Torek, Franz John Albert
1867 *Townsend, John Fondey. Died January 8th, 1874, aged 64
1847 *Townsend, Peter Solomon. Died March 26th, 1849, aged 54
1889 Townsend, Wisner Robinson
1888 Townshend, Arthur Bailey
1889 Tracy, Elmer Clark
1890 Tracy, Roger Sherman
1889 Trudeau, Edward Livingston
1857 Tucker, Carlos Phillips
1863 *Tucker, George Herriott. Died January 25th, 1862, aged 34
1891 Tuttle, George Montgomery
1888 Tuttle, James Percival
1854 *Tuttle, John Dodd. Died January 27th, 1870, aged 68
1890 Tyson, Henry Hawkins

1854 *Uhl, David. Died September 17th, 1858, aged 36
1847 *Underhill, Alfred. Vice-president, 1863–1865; trustee, 1866–1875. Died December 7th, 1873, aged 64

1847 *Vaché, Alexander Felix. Died June 9th, 1857, aged 57
1891 Valk, Francis
1847 *Van Arsdale, Henry. Died August 25th, 1888, aged 74
1847 *Van Arsdale, Henry. Made non-resident Fellow. Died January 25th, 1864, aged 44
1847 *Van Arsdale, Peter. Died 1858, aged 77
1888 Van Arsdale, William Waldo
1847 *Van Beuren, Thomas. Died November, 1848
1856 *Van Buren, Peter. Died December 5th, 1873, aged 71
1847 *Van Buren, William Holme. Vice-president, 1859. Died March 25th, 1883, aged 63
1890 Vandenbergh, Horace Clair
1847 Vander Poel, Edward
1887 Vander Poel, John
1882 *Vander Poel, Samuel Oakley. Died March 12th, 1886, aged 62

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1884 Vander Poel, Jr., Samuel Oakley
1888 Vanderpoel, Waldron Burritt
1859 *Vanderveer, Jacob Hart. Died August 20th, 1873, aged 55
1847 *Vandervoort, John Ledyard. Recording secretary, 1849; Made honorary Fellow 1887. Died July 19th, 1891, aged 82
1859 *Van Doren, Matthew Dikeman. Died November 2d, 1881, aged 63
1891 Van Giesen, Ira Thompson
1879 *Van Houten, Jacob Arthur. Died December 5th, 1880, aged 26
1847 *Van Kleek, John Robert. Trustee, 1862-1866. Died January 2d, 1876, aged 67
1847 Van Pelt, Moses Depew. Vice-president, 1860–1862; trustee, 1864–1868
1847 Van Rensselaer, Alexander. Resigned 1851
1879 Van Santvoord, Richard
1888 Van Valzah, William Ward
1847 Van Winkle, Edward Henry
1847 *Varick, Theodore Romeyn. Died November 23d, 1887, aged 61
1880 *Varley, Christopher Dixon. Died December 20th, 1887, aged 65
1862 *Vedder, Joseph Holland. Died July 18th, 1864, aged 33
1888 Vedder, Maus Rosa
1857 Vermilye, William Edward. Made non-resident Fellow 1873
1890 Vineberg, Hiram Nahum
1890 Von Ramdohr, Cæsar August Louis Herman
1854 *Von Roth, Waldemar. Died 1857, aged 35
1857 Voss, Albert Lothar. Made corresponding Fellow 1869

1876 Wagner, Clinton
1889 Waldo, Ralph
1886 Waldstein, Louis
1889 Walker, David Ernest
1889 Walker, Henry Freeman
1885 Walker, Leroy Pope
1887 Wallace, William
1887 Wallach, Joseph Gabriel
1891 Walter, Josephine
1873 Ward, Edward Fletcher. Assistant secretary, 1877–1879; recording secretary, 1880–1882
1853 *Warner, Everardus Brower. Died November 7th, 1886, aged 65
1888 Warner, Everett Seymour
1879 Warner, John Wesley
1885 Warren, John
1880 Warren, John Sidney
1847 *Washington, James Augustine. Died August 30th, 1847, aged 45
1853 *Watson, John. Orator, 1855; vice-president 1856,–1858; president, 1859; orator, 1860. Died June 3d, 1863, aged 56
1847 *Watts, Robert. Treasurer, 1847. Died September 8th, 1865, aged 55
1876 Webb, Zephaniah Swift
1867 Weber, Leonard
1879 Webster, David
1847 *Weeks, Cyrus. Died September 20th, 1875, aged 68
1886 Weeks, John Elmer
1866 Weir, Robert Fulton. Vice-president, 1881–1886
1891 Weiss, Julius
1870 Weisse, Faneuil Dunkin
1879 Welch, William Henry. Made non-resident Fellow 1885
1880 Weld, Francis Minot. Made non-resident Fellow 1887
1890 Wells, Brooks Hughes
1847 *Wells, Ovid Philo. Died July 22d, 1891, aged 86
1888 Wendt, Edmund Charles
1887 West, Frank Eliot
1887 Westbrook, Benjamin Franklin

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1885 Wheelock, George Gill
1847 *White, Ambrose Lipscombe. Died June 2d, 1865, aged 61
1889 White, Charles Bell
1858 *White, Francis Varian. Statistical secretary, 1878–1885. Died October 9th, 1889, aged 57
1890 White, Granville Moss
1877 *White, John Phillips Payson. Died December 3d, 1882, aged 43
1882 White, John Blake
1876 White, Octavius Augustus
1847 *White, Oliver. Vice-president, 1866–1868; trustee, 1874–1878. Died November 7th, 1879, aged 65
1847 *White, Samuel Pomeroy. Trustee, 1853–1857. Died June 6th, 1867, aged 66
1867 White, William Thomas. Assistant recording secretary, 1868–1870; recording secretary, 1871–1876; orator, 1876; vice-president, 1877–1879; trustee, 1880–1884
1891 Whitman, Royal
1875 Wiener, Joseph
1883 Wiener, Richard George
1891 Wiggin, Frederick Holme
1886 Wilcox, Reynold Webb
1880 *Wilder, Rufus Lawrence. Died December 15th, 1888, aged 43
1847 *Wilkes, George. Died November 30th, 1876, aged 75
1888 Williams, Herbert Franklin
1886 Williams, Mark Henry
1847 *Williams, Merrill Whitney. Died December 3d, 1873, aged 72
1860 *Winchell, Martin Ebenezer. Died May 1st, 1864, aged 34
1869 Winston, Gustavus Storrs
1882 Winters, Joseph Edcil
1889 Witthaus, Rudolph August
1879 *Wood, Charles Sacramento. Died Feb. 1st, 1890, aged 65
1847 *Wood, Isaac. Vice-president, 1849; president, 1850; trustee, 1851, 1852; president, 1853; trustee, 1859. Died March 25th, 1868, aged 75
1847 *Wood, James Rushmore. Vice-president, 1857. Died May 4th, 1882, aged 65
1847 *Wood, Stephen. Resigned 1878. Died March 7th, 1884, aged 73
1885 Wood, William Benjamin
1880 Woodbury, Edward Clarence
1887 Woodbury, John McGaw
1852 *Woodward, George F. Died 1867
1871 Woolley, James Van Sicklen. Resigned 1883
1891 Woolsey, George
1847 *Worster, Joseph. Died August 7th, 1877, aged 73
1847 *Wright, Aron. Died December 15th, 1885, aged 75
1869 *Wright, Charles. Treasurer for the trustees, 1879–1883. Died September 2d, 1883, aged 50
1890 Wright, Jonathan
1884 Wright, Joel Williston
1888 Wunderlich, Frederick William
1884 Wyeth, John Allan
1889 Wylie, Robert Hawthorne
1875 Wylie, Walker Gill

1873 Yale, Leroy Milton. Orator, 1879
1888 Young, Charles Elisha
1847 Young, William

1891 Zeh, Adolph

NOTE.—In order to secure completeness and accuracy, it is requested that additional data and corrections be sent to the Statistical Secretary.

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Stated Meeting, January 15th, 1891.

DISCUSSION ON CHRONIC CERVICAL ADENITIS IN CHILDREN.*

THE discussion was opened by the reading of a paper on

CERVICAL ADENITIS—ITS ETIOLOGY, SYMPTOMS, AND DIAGNOSIS.

BY A. JACOBI, M.D.,

NEW YORK,

LATE PRESIDENT OF THE ACADEMY, AND CLINICAL PROFESSOR IN THE COLLEGE OF PHYSICIANS AND SURGEONS, ETC.

THE great lymphatic trunks are three in number—the jugular, the subclavian, and the broncho-mediastinal. The first carries lymph from the head and neck; the second gathers that of the upper extremities and the anterior wall of the chest, and the third that of the lower extremities and the posterior part of the thorax. On the left side of the body the latter is represented by the thoracic duct, which attends to the collection of chyle and the rest of the lymph circulating in the abdominal and thoracic organs. These three trunks are usually but short, and discharge their contents, which float in the network of innumerable ducts, into the veins. Before so doing they sometimes join, on either side, into a common lymphatic trunk. The innumerable lymph ducts which form the trunks have to pass the so-called lymphatic glands; such of these which are peripherous send their vasa efferentia into the inner tiers; thus the vas efferens

* In charge of Section on Pediatrics.

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of the superficial glands becomes the afferens of one more centrally located.

The subject of to-night's discussion is the jugular trunk. Its large number of lymph ducts, both small and large, superficial and deep-seated, form an incredibly complicated but still regular network, which is subdivided into two plexuses—the superficial or external, and the deep or internal jugular plexus. The first gathers the ducts distributed over the occipital, aural, and temporal regions. There are the occipital glands (one or two) near the linea nuchæ, the frequent seats of disease in erysipelas and phlegmon of vertex and occiput; near these are the posterior auricular glands, situated over the insertion of the sterno-cleido muscle; with them combines a network of ducts originating in the territory of the facial veins. From two to four anterior auricular glands gather the lymph from the temporal regions, and are located above and below the parotid. The submaxillary glands collect the lymph of the forehead, eyelids, surface of the nose, cheeks, lips, and chin—indeed, all the surface parts of the face—also some of the cerebral portions, particularly the floor of the mouth, and part of the tongue. Here it is where the first deposits take place in epithelioma of the lip. Adjoining are two or three mental glands. To the same plexus belong five or six superficial cervical glands. They are covered by the platysma, lie on or behind the sterno-cleido-mastoid, and are intimately connected with the posterior auricular and the submaxillary glands. In them the lymph of the external ear and the skin of the throat and neck is collected, and many of the morbid processes take place in these superficial cervical glands.

The external and the internal jugular plexuses are, however, by no means strictly separated from each other. The latter receives the vasa efferentia of the superficial cervical glands, also the ducts of the central layers of the face with their four or six deep facial glands on the side of the pharynx, also a number of the vasa efferentia of the submental glands. The deep-seated facial glands, three

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or six in number, are situated behind the buccinator muscle and alongside the pharynx. They receive the lymph of the temporal and spheno-maxillary fossæ, of the orbit, the nares, the superior maxilla, palate, and pharynx. To them belongs a gland first described by Tortual, which lies between the long muscle of the head (longus capitis) and the sulcus of the posterior wall of the pharynx. Some of the retropharyngeal abscesses result from its morbid changes.

The internal jugular plexus extends also along the large blood vessels to the base of the skull, where it gathers the intracranial ducts. Its deep cervical glands, from ten to twenty in number, are distinguished as upper and lower, the latter being adjacent to and connected with the superficial cervical glands. The upper deep cervical glands collect the ducts of both pharynx and tongue, along which there are three or four lingual glands; also of the inner muscles of the neck, of larynx and thyroid gland.

The lingual glands receive most of the lymph from the tongue, the lower part of the pharynx, the deep muscles of the throat and neck, of the larynx and thyroid.

The lower deep-seated cervical glands are located in the supraclavicular space, on the brachial plexus and scalenus muscle, and extend as far as the axillary glands. Through the tier of the upper deep cervical glands they receive the lymph from the whole head and neck, and independently that of the lower part of the integuments of the skin, and of the muscles of the neck; of the lower part of the larynx, of the thyroid, and of the trachea; of the lower part of the fauces and of the œsophagus, of the vertebral canal and posterior part of the cranial cavity. They are intimately connected with the lymphatic glands of the axilla and of the thorax, and owe their peculiar pathological dignity to both the extent of their connection and communication, and their location behind and alongside the internal and the common jugular vein.

Curnow and Treves (quoted in Ashby's article on

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"Scrofulosis" in Keating's "Cyclopædia," vol. ii.) have the following table, destined to show the relation of glands to the territories drained by them:

Suboccipital and mastoid: Posterior half of head.

Parotid lymphatic glands: Anterior half of head, orbits, nose, upper jaw, upper part of pharynx.

Submaxillary lymphatic glands: Lower gums, lower part of face, front of mouth and tongue.

Suprahyoid: Anterior part of tongue, chin, lower lip.

Superficial cervical (beneath platysma): External ear, side of head, neck, and face.

Retropharyngeal: Nasal fossæ and upper part of pharynx.

Deep cervical (upper set along carotid sheath): Mouth, tonsils, palate, lower part of pharynx, larynx, posterior part of tongue, nasal fossæ, parotid and submaxillary glands, interior of skull, deep parts of neck and head.

Deep cervical (lower set in supraclavicular fossæ): Drain upper set of lymph glands, lower part of neck, and join axillary and mediastinal glands.

I have spoken of the organs which form the subject of our discussion to-night as lymphatic glands. This is the term by which they are mostly known. If for our purpose it were necessary, we might well question its appropriateness; for they are not glands, in the actual meaning of that term. They do not secrete, they are but receptacles, depots, hardly anything beyond that, and the term lymph bodies is more accurate than that of lymphatic glands. Both of the terms, however, may be used in to-night's discussion.

The frequency of morbid changes in the lymph bodies is explained by the large amount of cells which form the bulk of their structure. They are still similar to the embryonic cells, increase and proliferate as rapidly, and therefore tumefactions are brought about readily. As a copious net of blood vessels penetrates their follicular substance, they may undergo morbid changes through the intervention of the blood. When the latter is the cause of disease, the whole system of lymph bodies is liable to be affected simultaneously. This, however, is but

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an occasional occurrence. Indeed, in the majority of cases only groups of lymph bodies, or single lymph bodies, are affected. The cause of disease must then be looked for in the circulating lymph, which, both under normal and abnormal circumstances, is retained and filtered in the lymph spaces, which are not open tubes, but a fine network of cavities lined with endothelium. Foreign bodies of any description floating in the lymph are there retained and undergo changes. These, as also chemical changes of the lymph itself, irritate the lymph body and produce disease. Thus it is that but few morbid changes of the lymph bodies are primary; almost all of them are secondary.

These changes are mostly the result of, or complicated with, hyperæmia and inflammation. At once there is swelling and increasing consistence. In exceptional cases the tissue becomes softer. On section it shows hyperæmia, which may depend on either dilatation of the blood vessels, or the presence of a bloody serum, or hæmorrhages, or two or all of these conditions. The tumefaction of adjacent glands is sometimes such as to render the distinction of the single glands from each other an impossibility. Often they are flattened upon each other. Within the extended capsule the lymphoid cell constituents increase in different ways. Leucocytes are retained in large numbers, lymph cells continue to float in, a subdivision takes place, and the endothelia and nuclear cells undergo changes into similar or equal organic particles. This condition may undergo restitution, or a hyperplastic induration may take place through nuclear proliferation in the stroma. Besides, suppuration may occur, or necrosis. The fibrous induration is more frequently met with in the bronchial, tracheal, mesenteric, axillary, and inguinal glands than in the cervical. In the inguinal it is very common—so common, indeed, that they are frequently seen at every age without any morbid symptoms. This change exhibits, in many cases, its chronic character from the very beginning. The glands are not always enlarged;

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they are white and hard on section; the capsule is thickened; the cell substance is diminished; the gland appears to consist, more or less, of connective tissue only.

The suppurative change may be confined to the gland, at least temporarily, or the neighboring tissues participate in the process at an early period. Small abscesses originate mostly in the follicular substance, prove confluent so as to form a larger abscess, and finally burst or are incised. Recovery takes place by a shrinking process, by cicatrization, by the formation of a fistula, sometimes accompanied with lymphorrhœa when larger lymph ducts happen to be injured, or by desiccation, caseation, or calcification. This is the second form of chronicity.

The third series of chronic adenitis is the caseous. Its nature is that of an aseptic necrosis, mostly under the influence of scrofulous or tuberculous predisposition. Caseous adenitis is preferably found in the cervical, bronchial, and mesenteric glands. Its incipient stage is hyperplasia; next, cell conglomeration in the lymph spaces; one of the final changes, through deposition of carbonate of calcium either uniform or disseminated, calcification; another is softening, which, through absence of circulation and through the mutual compression of the crowding cell material, begins in the centre, but may succeed in perforating into neighboring cavities, such as trachea or veins. This simple caseation is often found by itself; sometimes, however, with tubercular caseation, also with fibrous inflammation. If the latter be predominant, actual or apparent recovery may take place. The genuine tubercular caseation looks very much like the non-specific kind, but it exhibits tubercles consisting of either small, round, lymph-like, or flat epithelioid, or giant cells, or a mixture of all of them, which, when confluent, form larger or smaller masses, either coherent or isolated, in the follicular tissue. There they are easily recognized, unless hyaline or colloid transmutation has taken place.

The *etiology* of glandular tumefaction, both cervical and general, on the basis of hyperæmia or inflammation, has

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been mentioned before under two heads. General infection may act through the blood; thus in universal putrid and septic infection, in anthrax, lepra, leucocythæmia and pseudoleucocythæmia, under the influence of Koch's lymph, in syphilis, also in enteric fever. In both of the latter, however, the local irritation results in local glandular affection by preference. Still more local is the action of the diphtheria virus. An example of more general infection, or rather predisposition, is the peculiar fragility and inflammability of all the tissues which we are accustomed to call scrofulosis.

The large majority of cases of adenitis, both acute and chronic, however, owe their existence to a local influence. They are produced by morphological or chemical changes in the circulating lymph, which result in local irritation of the lymph spaces of the glands. That result is mostly an acute adenitis. This acute adenitis is liable to undergo resolution, as stated before. It is much more liable to become chronic, however, unless relieved in time; for actual hyperplasia, when the proliferated or conglomerated cell material, particularly of the stroma, has become organized, is not amenable to easy reabsorption. Or the adenitis becomes chronic from the beginning, when the cause acts gently but persistently. The final result may be exactly the same in both cases. Whether there are other influences predisposing to bring forth either the acute or the chronic form, such as a peculiar congenital or acquired tendency, amount of cell accumulation, disturbance of the morbid process, or interruption of the regressive change, can hardly be determined in the individual cases.

After all, most forms and cases of adenitis are of local origin; it is that local origin which has to be traced in every single case. In many, that study is very simple; in others, particularly in those which have lasted a long time, the connection of chronic adenitis with its original source is no longer traceable. In the child of advanced years and the adult the history of chronic cervical tumefaction

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may, therefore, be quite obscure; in the infant and young child the elucidation of the etiology is mostly easy.

According to all that has been said, chronic adenitis in all its forms may result from lesions of any kind. The best protection against it is normal health and the absence of any breaks in the integuments. It is through these latter that septic invasions will take place. Traumatism will produce adenitis directly—thus a blow, a fall. But these cases are rare enough. Erysipelas has the same effect. Insect bites raise a glandular swelling immediately. The obstinate adenitis of the neck is often the result of pediculi, or of eczema, or of impetigo capitis; heal these—contrary to the public prejudice—and most of the glandular noduli and nodi disappear spontaneously. Of aural diseases, it is the mastoid abscess and a simple aural catarrh which result in adenitis of long standing. The fibrous condition of the floor of the external ear is easily perforated by a suppurating gland underneath, and recovery is very slow unless a counter-incision be made into the very abscess. The eye is productive of chronic adenitis through conjunctivitis and corneal ulceration. Herpes zoster, always a local disease following the course of a nerve, is the cause of local adenitis; left frontal zoster in a boy of seven produced suppurative adenitis in front of the left ear, and protracted chronic induration of the glands near the angle of the lower jaw and under the chin; cervical zoster tumefies jugular and cervical glands; labial and mental zoster, the frequent form of so-called fever blisters, give rise to adenitis, both acute and chronic, sometimes characteristically unilateral. The nose is a frequent source of cervical adenitis; every ailment interfering with the healthy condition of the mucous membranes gives rise to adenitis, from an innocent nasal catarrh to its consecutive ulcerations, from the lesions produced by a foreign body to the septic influence of diphtheria. A small number of cases of so-called scrofulous glands of the neck, for which the children had been punished with cod-liver oil, have been cured by the extraction of shoe buttons. No tot

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with a persistent running of the nose, not to speak of the danger incurred by the upholstered chairs and the trousers of the doctor, will escape its dozens of enlarged glands; they will be either prevented or mostly cured by keeping the nose clean with a physiological salt-water solution only, to the exclusion of everything else. It is a peculiar instance of specialistic oversight that in a book on nasal diseases by Turasz, just published, no single mention is made of adenitis as a sequela of nasal catarrh. Boring in the nose, resulting from any irritation of the mucous membrane—for instance, from intestinal causes—with its local lesions, is productive of chronic adenitis. That is the explanation of the alleged connection of intestinal parasites with adenitis. Worms irritate, both by direct influence and reflex action, the mucous membrane; this is injured by the infant fingers, and the local lesion resulting therefrom produces the tumefaction of the glands.

There is perhaps no better illustration of the rapidity with which adenitis is apt to come and go, according to the neglect or treatment of the nose and naso-pharynx, than nasal diphtheria. There is nobody here but has met with those cases in which the cervical glands would swell within hours, within a day, to such an extent as to render the poor sufferer unrecognizable. These cases of nasal diphtheria were given up as lost twenty-five years ago. It is only since the connection of this ominous septic adenitis with its source in the nasal mucous membranes was fully recognized, and my demand to disinfect the nasal mucous membrane has become fully appreciated, that nasal diphtheria is no longer the absolutely fatal disease which it was believed to be. As fast as the glands swell under the influence of the septic poison, just as rapidly will they diminish in size under that of cleanliness and disinfection. If not so reduced they will lead to death or chronic changes. These latter are of different characters. Many will become hard and persist in that form; some few will suppurate in small multiple places, which may remain a long time undiscovered and unhealed. Al-

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together, however, suppuration is not so frequent in diphtheria as it is in other inflammatory or infectious diseases. In not a few cases of the severest types necrosis will be the termination of the acute swelling.

Cracked lips permit the invasion of microbes and the development of consequent adenitis; epithelioma influences the neighboring glands in the same way. Every form of stomatitis—the follicular, aphthous, and parasitic—and the denuding of the surface by a burn (hot food included), have the same effect. The tongue is a frequent cause of adenitis, either through catarrh and inflammation, or the surface lesions in infectious diseases. There is no better protection to the system than intact integuments. The most injurious poisons, such as peptones and enzymes, are changed into albuminates in a healthy mucous membrane; but cracks and rents allow them to enter the circulation directly. Not only does such an occurrence take place in the stomach and intestine, but in the mouth and tongue. The cracked tongue of a typhoid patient is an inlet to micrococci of all sorts; it is they which destroy more patients than the original typhoid infection. The first to suffer are the neighboring lymphatic glands. They also suffer in general catarrhal and inflammatory angina, be it the result of an infection, or a foreign body, even a fish bone; not so much in circumscribed affections of the tonsils, for these are so snugly surrounded by a solid fibrous capsule that an extensive lymph communication with the system is out of the question. Thus it happens that even in diphtheria, when it is limited to the tonsils, the glands swell but little if at all, and constitutional symptoms are but few, in contradistinction from deep-seated follicular, inflammatory, or suppurative amygdalitis, all of which produce an active fever and systemic disturbances. Partly through their influence on the surface, partly through their pharyngeal complications, will measles, scarlatina, and other infectious fevers affect the cervical glands.

Dentition, as long as it takes its physiological course,

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has no such influence, but as soon as the gums undergo a high degree of hyperæmia and irritation the glands become affected; so they will from carious teeth, periostitis, osteomyelitis, or phosphorus necrosis; so also from the presence of parasites—for instance, the streptothrix of actinomyces. Through their irritating influence on the oral mucous membranes, drugs will have the same effect —for instance, mercury and iodine.

Vaccination, particularly when animal lymph was used, according to Ashby, has been observed to result in cervical adenitis, even without much general disturbance. The axillary glands are in intimate connection with the cervical, which may swell with the former. Chronic bronchitis results in swelling of the mediastinal glands; their intimate connection with the lower tier of the cervical affects these; that observation can be made in those chronic bronchitides of the tubercular and rachitical babies in many instances; acute pulmonary diseases exhibit similar results. The vaso-motor changes of the face, its local flush lasting for days, mostly unilateral on the side of an acute pneumonia, are well known; not so commonly known, however, is the tumefaction of cervical glands in cases of pleuropneumonia of the upper lobe. This disease has an immediate influence upon the intrathoracic lymph bodies adjacent to the apices, and through them on the suprajacent cervical lymph bodies.

As the glandular tumefaction develops very fast, and an acute adenitis becomes chronic in the different ways alluded to before; as, moreover, the local irritation is by no means always arrested in the nearest gland, or group of glands, the cause of the morbid changes may disappear, may not even be remembered, but the result remains in the shape of either hyperplasia or chronic suppuration and cicatrization. The former condition is more frequently seen in advanced years, and in deep-seated glands which are least exposed to external injuries, than in the early period of life and the glands near the surface.

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I shall close, Mr. President, with a few remarks referring to *diagnosis.*

Pus inside a gland is not always detected with ease, for the multiple abscesses are often but small. Though they melt together into a larger abscess, the presence or absence of fluctuation is liable to depend on the thickness and rigidity of the capsule. Now and then fluctuation is readily felt; if not, there is sometimes a circumscribed soft, small spot which can be discovered by steadying the organ between two fingers of one hand and gently tapping on the suspended place with a finger of the other. Local pain is frequently absent. When, however, the neighboring organs participate in the process, and the skin becomes red and sensitive, the diagnosis is easy enough. The sensation of fluctuation, however, is often misleading. Large glands may be mistaken for sarcomata, and *vice versa.* These latter pseudoplasms yield a peculiar apparent fluctuation, though there be no complication with cysts. This semi-fluctuation is almost characteristic of sarcomata in every region. I have described it in the fœtal and infant sarcomata of the kidney, in an essay which was published in the Transactions of the Eighth International Congress of Copenhagen, in 1884. In this connection I may add that it may become altogether difficult to determine the exact nature of the glandular swelling. As I said before, the presence of pus cannot always be discovered at an early moment. Nobody can say, with positive certainty, when the first central softening takes place, nor to what extent there is, in an individual case, a mixture of the hyperplastic, cellular, or caseous, either simple or tubercular, elements. Still less is there an absolute certainty, in every case, of the presence or absence of a malignant nature in a large glandular swelling. The difficulty is so much the more comprehensible the greater the variety in the morphological diagnoses of the histologists; indeed, the application of the terms lymphoma, adenoma, and sarcoma is not identical with the different authors. Besides, the frequency of such terms as lymph-

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adenoma, lymphosarcoma, and adenosarcoma proves the impossibility of establishing fixed boundary lines between the several forms. The gradual increase in size, however, without softening, speaks for the malignancy of the tumor. The presence of more swellings of the same character in other parts of the body, either simultaneously or within a limited time, may prove the existence of Hodgkin's pseudoleucocythæmia; the same with the enlargement of spleen or liver and the characteristic changes of the blood, that of leucocythæmia.

The diagnosis of glandular abscesses, to differentiate them from suppurations of other sources, is not always easy. There are retro- and latero-pharyngeal abscesses, penetrating to the surface; those resulting from caries of the mastoid process, the vertical column, or the maxilla; those from the sternum and sternal junction of the clavicle, which ascend along the sterno-mastoid muscle; those originating in a myositis of this muscle, or in a periostitis of the hyoid bone or perichondritis of the cricoid cartilage, or the rare cases of perforations upward, of pulmonary cavities, or empyema; those rising from metastatic carcinomatous glands or from old cicatricial tissue. All of them may test the observer's experience and dexterity. In a number of cases the diagnosis will be determined by the original localization of the swelling, or of the pain, if any there be, and by the first seat of secondary symptoms, such as difficulty of deglutition, respiration, or muscular function.

DISCUSSION.

Dr. William H. Thomson prefaced his remarks on this subject by saying that he agreed with Dr. Jacobi that a cervical adenitis was usually the result of some local affection; in other words, of some infective material brought to the gland by its lymph channel from a local lesion. Besides this, however, we might add another factor, namely, the greater or less amount of resisting power. He believed this had as much to do with the adenitis as the specific infection itself. Entertaining this view, he had for years considered the question why children should have

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adenitis nine times to adults once. What was there in the constitution of children which predisposed them to this form of infection, especially as it affected the lymphatics of the neck? There must be some physiological basis for it, and he believed it was referable peculiarly to the disproportionate growth and activity of the nervous system at this age. When we reflected, he said, that the brain grew nearly to its full weight for life between the second and seventh years, an example was afforded of more rapid growth and more actual increase in bulk in a given period than in any other tissue or organ of the body excepting the pregnant uterus. During this period, too, the brain showed greater functional activity than it would ever do again. It had to acquire language, acquire impressions of the external world, form ideas thereon, etc. He said that if the brain of the adult could learn in one year what the brain of the child learned in one month of entirely new acquisitions, and learn them as well and as permanently, man would become a prodigy in a few years. This rapid growth of this highly endowed and vascular organ of the body drew upon the blood to a greater degree than was done by any organ at a subsequent period. This great drain upon the system left the other organs in relatively a condition of poverty. Whatever might happen, there was one tissue in the body which would not cease its demands upon nutrition, namely, nervous tissue. It was the only tissue which did not lose bulk in starvation. The relatively poorer tissues therefore showed the first signs of starvation. The first indication of the starving process would be noticed in the cornea of the eye, then in the hair, in the skin, etc. Scrofulous children had short, stubby hair, wanting smoothness and gloss; the skin became harsh and dry. Ultimately he traced these conditions, signs of failing nutrition, to the excessive demands of the brain upon the nutritive supply. With a harsh skin there went along such conditions as phlyctenular conjunctivitis, otorrhœa, chronic naso-pharyngeal catarrh, enlarged tonsils, eruptions upon the scalp—conditions which, as Dr. Jacobi had said, favored adenitis. Therefore, in the treatment of the disease he considered the kind of food which would supply the materials demanded by the nervous system. For that reason he believed the greatest prophylactic in adenitis was cod-liver oil. That it supplied food called for by the system at this age was evident from the fact that children relished it, while adults found it

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repulsive. No other agent produced equal results in increasing the red blood corpuscles. He had very little confidence in the medicinal action of the iodides in very young children, although after the twelfth year iodine itself was at times of benefit. The physician in charge of an orphanage once told him he had a large number of cases of scrofulous abscesses for which he had tried every remedy, including iodides, unsuccessfully. Dr. Thomson told him to try Lugol's solution in one or two-drop doses, or tincture of iodine. He did, and reported favorably.

There was one other agent which he had had occasion to use in a way to put it to a severe test, in consultation cases where ordinary means had failed. He referred to chloride of calcium. He gave the United States officinal solution, half a teaspoonful increased to a teaspoonful—for a child, diluted with equal parts of syrup of ginger—taken in water immediately after meals.

Dr. A. G. Gerster opened the discussion of the surgical treatment of adenitis. He emphasized the point that modern surgeons, in treating adenitis, did not rely solely upon the knife; they treated the general condition of the patient, but, since that phase of the subject had already been discussed, he would say little upon it. Speaking, then, of the local surgical treatment, he said that the first question in a case of intumescent glands was, had we to deal with an acute or a chronic complaint? Acute glandular affections had to be dealt with generally in a different manner from the chronic. If, after giving attention to the etiological indication, we did not succeed in causing the intumescence to disappear, particularly if there were fever, we should suspect pus in the centre of the gland. If the glandular intumescence were steadily increasing, and the signs pointed to hidden pus, the tension should be relieved by incision. The popular method was to apply poultices; he did not object to it as a tentative measure, but it should not be persisted in too long. If the glandular disease were deep-seated and the physician feared he might injure important vessels in making his incision, let him lay the knife aside after passing through skin and superficial fascia. If doubt were felt as to the exact location of the pus, insert the hypodermic needle. Finding pus, before withdrawing the needle introduce alongside of it a grooved director, then withdraw the needle and along the grooved director introduce a dressing forceps and dilate. It was good practice to insert the little finger and break down

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partitions, insert a drainage tube, and apply the dressing. There was a form of glandular swellings, occurring oftener in adults than in children, in which neighboring glands broke down one after another. Here he found it quicker and safer to dissect out the whole mass while treating the first abscess. If pus came in contact with the wound, do not close it at once, but pack for three or four days with iodoform gauze; then, if the wound were in good condition, remove the gauze and suture.

Chronic forms of glandular swellings varied in their degree of acuteness, and should be treated accordingly. If they occurred in connection with diphtheria, scarlet fever, etc., strict attention must be given the mucous or cutaneous surface from which absorption had taken place. If pus were present in the gland it should be evacuated.

Speaking further of the treatment of chronic glandular affections, Dr. Gerster said he thought all glandular troubles might be divided profitably into two classes: one in which the positive element was pyogenic infection, the other in which tuberculosis was the cause. In the first class, proper treatment directed to the exciting factor would often effect a cure, especially if aided by local measures. The ice bag was of benefit, applied early; it might do harm after pus had formed, and at this stage patients usually found it uncomfortable. There was a time when we could not decide whether suppuration had taken place or not, and here he found the application of a poultice to be proper.

In chronic forms of pyogenic origin great disfigurement sometimes resulted when they were left to the tender mercies of Nature; in girls, where the cosmetic effect had to be considered, the surgeon could do much to prevent disfigurement by aspirating the abscess and washing it out on different occasions until it ceased to refill. Usually four or five times answered. In children whose general condition was growing lower from the presence of chronic suppurating lymphadenitis, he dealt radically with the source of infection—reopened the abscess and scooped away the pyogenic and ulcerating glandular tissue.

In the case of tubercular glands in children, one might think there was suppuration and fluctuation when there was not. Aspiration would decide. He believed that all forms of tuberculosis in the human body were spread through the intervention of the lymphatics; that the glands became the depot of the germs, and from there

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they spread. An early diagnosis was not always possible, but where the glands became solid he looked upon it as a warning note and removed them, if it could be done with safety to the patient. If allowed to break down, and communication took place with the air, hectic would develop, blue, attenuated marginal tissue would be seen, ugly scars form. Bluish, non-viable cutaneous margins should all be removed by scissors and forceps, and adjacent enlarged glands be extirpated. He emphasized the importance of cleanliness in all operations, particularly in aspirating and washing out glandular abscesses.

DR. B. F. CURTIS thought that in cases of glandular enlargements of the size of a hen's egg, even up to the size of the fist, there was ground for difference of opinion as to treatment. Those surgically inclined would probably use the knife; those medically inclined would probably try medicine. He agreed with Dr. Gerster that both means should be employed. In favor of surgical treatment was the danger of general tubercular infection. The size of the tumor would have considerable influence in deciding the choice of treatment, particularly in children, who bore loss of blood and prolonged operations poorly. Every case had to be decided on its own merits, but the majority of the doubtful cases would eventually, he thought, fall to the surgeon.

DR. W. W. VAN ARSDALE said he had treated about five hundred and fifty cases of lymphadenitis in children the past year, including all kinds excepting syphilitic ones. Lymphadenitis in general had been more frequent in children (seventy-seven per cent) than in adults (twenty-three per cent); and the percentage of cervical adenitis alone, of all kinds, had been comparatively even greater, eighty-five per cent of the children against forty-six per cent of the adults being thus affected. But where the diagnosis had been made of tubercular adenitis there had been a greater number of cases in adults—six per cent in children, eleven in adults. Of what had been spoken of during the evening as chronic septic adenitis, twenty-one per cent of the cases had been in children, against twelve per cent in adults.

DR. H. KOPLIK had found that half the battle in treatment consisted in diagnosis. Regarding etiology, there were some cases in which it was somewhat uncertain, especially those called benign adenitis. Here the glands did not become very large, and, after the acute attack had passed away, still remained large, belonging, perhaps, to

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the class spoken of as hyperplastic. They were not tubercular, caused no trouble, but for cosmetic reasons their presence was objected to by parents and patients. Dr. Koplik drew special attention to syphilitic lymphadenitis, which, up to the present, had received comparatively little discussion. The etiology was important in connection with treatment. He thought scrofulous and tubercular cases might well be grouped together. They gave about the same picture, although in both the tubercle bacillus sometimes might not be found.

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Stated Meeting, February 5th, 1891.

THE NEW YORK ACADEMY OF MEDICINE—WHAT IT IS AND WHAT IT MAY BE.

INAUGURAL ADDRESS.

By ALFRED L. LOOMIS, M.D.,
NEW YORK.

FELLOWS OF THE NEW YORK ACADEMY OF MEDICINE:—When, two years ago, my distinguished predecessor introduced me as your President-elect, I stated that history alone must say with what degree of success the work which he had so ably begun will be continued. As a slight contribution to that history, permit me to briefly review the records of these two years.

On assuming the presidential chair I found your trustees already in possession of a building fund of $98,300, a fully organized Subscription Committee at work to increase this sum, and a Site Committee appointed by the Council, whose reports of available locations, however, had been met by such diverse opinions that no decision had been reached. The unanimous recommendations of a second committee, which had been appointed by the Council in November, 1888, whose field of search had been limited to the twenty blocks above Thirty-fourth Street between Park Avenue and Broadway, in favor of the present site of our building, met with unanimous approval as early as December 7th, 1888. Yet it was only after many discouragements, with great vexation of spirit, and considerable pecuniary loss to some members of the committee and their personal friends, that, on February 26th, 1889, the Council ratified the purchase of the present site for

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$90,000. Ten days later, on March 7th, the formal approval of the Academy was recorded, and at a meeting of the Council, on the 26th of the same month, Drs. Jacobi, Herrick, Peters, Castle, and your President were appointed a Building Committee, to whom all details of the work were to be referred. The organization of this committee, which was completed at their first meeting by the election of Dr. Loomis as chairman, and Dr. Castle as secretary, was followed immediately by an invitation extended to Messrs. J. C. Cady, C. C. Haight, and S. R. Robertson, architects, to submit plans and elevations for a new Academy building. This invitation of March 27th met with such prompt compliance from these gentlemen that within less than a month the Committee had made such careful comparisons of the submitted plans, under the personal demonstration and explanation of their respective authors, as to reach a unanimous approval of those presented by Mr. S. R. Robertson, and upon April 15th we were permitted to indulge in mutual congratulations upon the appointment of Mr. Robertson as architect of the new building.

A second month was consumed in the preparation of specifications, in suggesting desirable changes in plans, and in arranging contracts, until, upon May 7th, with all contracts signed for a sum total of $149,000, pick and spade made the first stroke in the work, the completion of which we have so recently celebrated in the dedication of this building. The 15th of July witnessed the fixing of the first foundation stone, and on the 2d of October, 1889, we had the pleasure of formally laying the corner-stone, assisted by some of the most distinguished laymen of our city.

The sale of the old Academy building for $60,000, early in May, 1890, necessitated the removal of our library before the completion of our new building; but as the stack room had been completed and rendered safe for its reception, its removal was accomplished during the latter part of the same month. Notwithstanding the many last

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things that always arise in connection with such a work' and the annoying details and disappointments which seem to be unavoidable, the building was finally completed, at a total cost of $151,000, within eighteen months from the commencement of the excavation.

Several meetings had been held in the new building before this—the first being that of the New York Pathological Society, on September 24th. The first general meeting of the Academy in its new building was held on October 2d, just one year from the date of laying the corner-stone, and to Dr. Charles McBurney belongs the honor of having presented the first paper read before the Academy in its new building. Although regular meetings have been held since, it was not until November 20th that the building was thrown open to the public, at a general reception, and assumed its position as the headquarters of the medical work of the city.

Notwithstanding the confusion of house-moving, the Academy has missed but one meeting, while at the thirty-five meetings that have been held during the past two years sixty-five papers have been read and received valuable discussion. This work of the Fellows has been of a high order of merit, and has done much to increase the already enviable reputation of this body for thorough scientific work. A most gratifying feature of recent years has been the increasing number of the younger members, who have manifested, not only by their regular presence at the meetings, but by participation in the discussions and willingness to contribute to the scientific work, an unusual interest in the welfare of the Academy —an interest which promises that the future shall find earnest and faithful men to whom the honor and well-being of this Fellowship will come as sacred trusts.

Within this same space of two years the various sections of the Academy have held over one hundred meetings, at which more than that number of papers have been read and discussed. Such a record shows a marked increase in the amount of work being done in this Fellowship. An

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especially pleasant feature of the past year has been the assumption by each section, in order, of the charge of one regular meeting of the Academy each month. Such a course has brought the sections into closer relationship with the Academy, has stimulated them to more careful work, and excited a keener interest in the regular section work.

It is to be hoped that an honorable ambition and generous rivalry will incite them to present the best work of the year when they appear in the general meeting of the Academy.

Our numerical growth has been equally marked in all directions: one hundred and thirty-five resident members have been received into our Fellowship, while the reaper's sickle has taken but few of our number. Nearly two thousand volumes have been added to our reference library, in addition to the ten thousand and odd numbers of medical journals which have passed through our reading room each year. A conservative estimate of the property of our Academy to-day makes its value not less than $400,000, of which $280,000 is in real estate, $70,000 in library, $15,000 in furniture, and $33,000 in invested funds. Against this we have a debt of only $30,000, with a membership of seven hundred resident Fellows.

With such a present, what should be, what must be, the record of the two years upon which we enter to-night?

Both '91 and '92 will bear the stamp of what *we* do.

Opportunity implies obligation, and power develops by direct evolution into action. We cannot shelter our indolence under the cloak of yesterday's successes. Seven hundred earnest, faithful physicians should form a centre of power in all matters pertaining to the health of this city and State that no civil authorities could withstand.

If this Academy could find in every member a firm and loyal follower of its standard, ready to uphold it both in this hall and in public, ready to advocate its claims to be the authority in matters medical among all his patients and friends, the time would not be far distant when we

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could send our representatives to the halls of legislation, and demand, in the name of the people, that this must be done, and the other left undone.

We do not make such claims in arrogance, but in the just consciousness that the medical man knows no party or politics, and that he has gone beyond even the fundamental principle of our Constitution. We demand, not "the greatest good for the greatest number," but "the one good for all." That we may the more effectually assume this position this Academy must be, not the best representative of medical men in this city, but it must be *the* representative of *all* medical men.

In my address two years ago I spoke of the diffusion of forces among the profession, and the misfortunes attendant upon the attempt to cover many fields. There is no need of argument to prove that all the medical talent and scientific work in our city should be centralized. With an average of more than three meetings each week, distributed among twelve sections, in addition to the general meetings, abundant opportunity is certainly offered for the presentation of all the valuable work that finds outlet in this direction. Nor is even this our limit of growth; we offer a home and a parent's fostering care to those who are interested in any special branch of medical work. Is it not more creditable to be a vital and valued member of one grand herculean organism, than an isolated and powerless unit, a Liliputian anatomy?

Would not the Pathological Society, for example, be more honored in being the Pathological Section of the Academy than remaining an independent organization? It would by such a union not lose its character as a body devoted to special research, but it gains the honor of being a necessary part of a great scientific whole. Such changes imply, of course, the putting aside of self, the doing away with little bitternesses and anger, malice and clamor, and rising to that higher plane and purer air where the cry of pain and anguish are our bugle calls to duty, and honor and human sympathy become stronger than

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self. The jealousies and intolerance of cliques are fast giving place to liberality and good-fellowship. The links which bind us together are being forged with greater strength; every Fellow is realizing more and more that there is resting upon him the good name and fair fame of our Fellowship, and that he should bear himself with greater pride that such high privileges have been entrusted to his care.

It is told of the Greeks that they arranged their soldiers in families, for then each man fought, not for Greece alone, but for his friends, counting it joy to give his life for those he loved. If friendship makes better soldiers, duty as well as inclination bids us to be better friends. Let us then cultivate more largely friendly relations with each other by frequent social intercourse. To this end it seems to me exceedingly desirable, and I would propose, that one evening each month, in addition to our regular meetings, or, if it seem better, a portion of our regular meeting each month, shall be set apart for this special purpose.

While both recognizing and urging the expansion of our activities in every appropriate direction, I desire to suggest two advances which seem most plainly to demand immediate attention. In the practical line, there should be established by the Academy a Nurses' Bureau, where only reliable and carefully selected persons should be allowed to register. It is not fitting that personal gain should be the basis of such registration, as the personal experience of every Fellow must convince him is the case in most of the existing nurse agencies. An examining committee from our Fellows should be appointed, to systematize, control, and decide all matters relating to such a bureau. The other and more important advance which I desire to propose is the establishment of a volume of Transactions of the Academy. Such a volume should consist of the aggregation of monthly issues of a bulletin, somewhat after the plan adopted in the *Johns Hopkins Monthly Bulletin*, such bulletin to be edited by a competent corps of Fellows, and conducted upon such an impar-

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tial basis as to afford a permanent record for all the best work done in our Fellowship—a filter to protect the hurried practitioner from wearying himself with simple recitation and useless speculations. I am convinced that such a paper, issued under the authority of this body, would not only receive such support from the profession as to make it sustaining, but, what is of far greater importance and value, would afford such honorable recognition of merit as to stimulate every worker among them to sift his own work more carefully to make it all of higher value, and to present publicly only what is fully worthy of a permanent place in medical literature. All these advances imply labor, and, in a measure, a labor of love. But here, as elsewhere, the past gives pregnant promise for the future. The quiet peace of these halls, the stately beauty of this building, give more lasting praise than words can do to those who have borne the heat and burden of the day—a praise that is justly due to all who have taken part in this work, and which must stand as more or less of a reproach to those who have contributed neither silver nor sympathy, but who now come to enjoy the results with all the complacency of fellow-laborers, even while the confession is on their lips, "This is the first time I've seen the building."

To the faithful ones my public expressions of praise can be of but little value, yet, for justice's sake, if for no other, this acknowledgment of their service is due to all, and especially to Dr. F. A. Castle, whose faithfulness to detail, as well as comprehensive grasp of the whole work, whose patience and perseverance, whose indefatigable activity and hard work, have done more than any one to make our house a home. Nor can I fail to acknowledge the deep obligation we owe to Mr. Robertson, our architect, who has not only given us his best thought in planning our new building, but by his painstaking care and judgment in awarding contracts assumed the unusual labor of both architect and contractor, and by so doing

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has diminished by many thousand dollars the cost of our building.

And now for the years that are before us. Shall the Academy be the power which is to elevate our profession to a higher social and intellectual plane than it has reached in the past? Shall it take the lead in the many rapid transformations that are taking place in every department of science? Shall it be the guardian to preserve and sustain an ideal medical spirit in the profession of our city, or shall it be simply a mutual-admiration society for the delectation of the few?

It will be, gentlemen, what you and I make it. If we hope to utilize the great privileges and benefits which have come to us, and do our duty to ourselves, our profession, and the commonwealth, we must realize that words are not work, that talk is not truth, that fancies are not facts.

Let every Fellow remember that great gifts demand great returns, and that the Academy stands ready to mete out with equal hand both rewards and reproofs.

Thanking you, gentlemen, for this second honor, and feeling that I can better express my appreciation of your unusual confidence by action rather than by words, I pledge that my earnest and best efforts shall be exerted in the future, as in the past, for the welfare of our Academy.

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HEMIANOPSIA.

By HENRY D. NOYES, M.D.,

NEW YORK.

THE subject which I am to consider is a visual manifestation of intracranial disorder. My remarks will relate to the visual disturbance rather than to the cerebral pathology. I ask more critical attention to this symptom, in the hope that light may be shed upon the intricate problems of cerebral disease. The aim is to reach greater precision in cerebral localization by closer study of visual symptoms.

Let us briefly sketch the course of the visual tract from the retina to its ultimate destination in the brain. The peripheral percipient elements in the retina are the cones and rods, which are connected by fibres with the outer and inner granule layers and by successive fibres with the ganglion cells; from these proceed the optic nerve fibres. The number of cones and rods is estimated to be seven times as numerous as the optic nerve fibres, and the estimate of optic fibres is between four hundred and thirty-eight thousand (Salzer) and one million (Krause).* The optic nerve fibres lie in layers, but in the region of the macula lutea they are finer and in fewer layers, and anastomose freely. At this space the bundles into which they are collected cannot, as elsewhere, be separately traced. The macular fibres are the most important in function, and are clustered into a triangular bundle composing about one-fourth of the nerve, which

* For these statements see Wilbrand, "Die hemianopische Gesichtsfeld Formen," Wiesbaden, 1890.

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enters the papilla at its infero-temporal side. As it pursues its way through the orbital portion it gradually approaches the axis of the nerve, which it reaches at the optic canal. At the front of the chiasm it occupies its upper and inner portion, but in the tractus it sinks to the central portion and remains there until it arrives at the brain. The semi-decussation of the optic tract in the chiasm is an accepted fact, despite the incredulity of Michel. The papillo-macular bundle is likewise divided into crossing and direct fibres, which at the anterior part of the chiasm can be separately distinguished, but at its posterior part and in the tractus become inextricably mingled. The macular fibres anastomose with each other in the retina, and they have additional opportunity to do this in the chiasm and the tractus. The tractus winds around the crus cerebri and terminates in two roots upon the corpora geniculata externa and interna and upon the posterior part of the optic thalamus, called the pulvinar. Fibres also go to the anterior pair of the corpora quadrigemina, but these organs are not regarded as concerned in vision, but in the activity of the pupil. The parts just referred to are called the primary visual ganglia.

In them we find innumerable ganglion cells in which fibres of the tractus lose themselves, and thereafter a new set of fibres proceeds backward through the posterior part of the internal capsule to the cortex under the name of the visual radiation, or fibres of Gratiolet or of Wernicke. Passing through the internal capsule, they cross the sensitive fibres coming down from the hemisphere, are rather closely massed, and then, spreading out like a fan, rise upward, wind outside the tip of the lateral ventricle to reach their destination at the lower part of the median surface of the occipital lobe.

Varieties of Hemianopsia.—In all cases the dividing line is either horizontal or vertical, the definition not being very exactly interpreted. There may be loss of half the field in only one eye, and this points out a lesion of one

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optic nerve in front of the chiasm. If both upper or both lower half-fields are wanting, the seat of lesion will be on the lower or upper part of the chiasm, or of both optic nerves. A case very briefly reported in the *British Medical Journal* for November 22d, 1890, had loss of the upper half of the field in one eye, and of the lower half in the other eye. This requires a double lesion in front of the chiasm. Total blindness of one eye combined with loss of the half or of the quarter of the field in the other is explained by a lesion of both nerves, on one side complete, on the other side incomplete. All these are peripheral lesions; and the same is true of the cases of bitemporal and binasal hemianopsia. Bitemporal half-blindness is explained by a lesion at the middle of the chiasm involving the crossing fibres from both tractus. It may be from a tumor (Weir Mitchell), it may be from fracture at the base of the skull, etc.

The excessively rare condition of binasal hemianopsia presupposes a lesion on both sides of the chiasm, or on the outer side of each optic nerve, and impairs the direct fibres (Knapp).

We are chiefly interested in another variety of hemianopsia, viz., that which affects the same side of each field and in which the dividing line is nearly vertical. This variety, called homonymous, implies injury of the visual tract behind the chiasm. On this subject most admirable papers have been written, by Starr, 1884; by Seguin, 1886 to 1887; by Hun, 1887; and by Swanzy,* in which are set forth other distinctive and localizing symptoms which accompany the visual defects, by which the focus of the disease may be more or less accurately determined. To these symptoms I shall only incidentally refer. My purpose is to call attention to some peculiarities in the fields of the vision which have not been generally attended to. I am indebted for much of what I

* Transactions of the Ophthalmological Society of the United Kingdom, vol. ix., 1889.

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offer to the last monograph by Wilbrand, an atlas of hemianopic defects, 1890, Wiesbaden.

The dividing line in hemianopsia is sometimes precisely on the vertical meridian and straight. That it is many times not on the vertical meridian and not straight has long been observed.* This occurs both in the peripheral, *e.g.*, bitemporal, and in the central forms. It may bend around the point of fixation upon the blind side, and thus greatly mitigate the injury inflicted on sight by sparing the whole of the macula lutea. That the boundary of the blind half may not for a considerable extent reach the vertical meridian, and may be a sinuous or oblique line, or form an open angle, has also been noted. Wilbrand points out that in seventy-seven cases of homonymous hemianopsia the dividing line was central in twenty-nine cases. In thirty-three the blind portion was smaller than the seeing portion of the retinæ, and to an equal extent in both eyes. In five cases the dividing line was in one eye central and in the other eye was pushed away from the fixing point toward the blind side. In ten cases the amount of displacement of the dividing line beyond the vertical meridian was unlike in the two eyes. The blind side is always either smaller in area than the seeing side, or may be equal to it. It is never greater.

Out of thirty-two cases of bitemporal hemianopsia, in only nine did the boundary coincide with the vertical meridian. In twelve total blindness of one eye precluded comparison. In twenty cases the blind sides were the smaller. We cannot, at present, draw any practical deductions from these facts, and in explanation of them we have to refer to the anastomosis of the fibres from each tractus in the retinæ as well as in the optic nerves and chiasm where crossing and direct fibres lie in close relation to each other.

But a new significance attaches to this circumstance since the publication within the year of two cases of

* See Schweigger: Graefe's Archiv, vol. xxii., Abth. iii., p. 276, 1876.

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double hemianopsia, one by Forster,* and another by Schweigger.†

Forster's case was a man who at forty-four years of age had from apoplexy complete homonymous hemianopsia on the right side, with preservation of 1° or 2° of the field toward the blind side, at the macula.

He had another attack five years later, which befell the opposite side and caused complete loss of the remaining halves of each visual field. The second attack did not reach completeness until after three days. When Prof. Forster examined the man six weeks later he seemed to be totally blind in every sense. His pupils were about four millimetres wide and gave a feeble reaction to light. This led to inquiry as to possible vision, and it was found that he could read Snellen $1\frac{1}{2}$ very slowly with each eye; distant vision was about $\frac{1}{10}$. Perimetric examination revealed the preservation in each eye of a central field measuring about 2½° vertically by 3° horizontally and below the horizontal meridian. It would cover a surface 13.5 centimetres (about 5¼ inches) in diameter at the distance of 3 metres. There was no perception of color. The ophthalmoscopic appearances were normal.

Schweigger's case was a man seventy-five years of age, whom he had treated for years for chronic conjunctivitis and incipient cataract. I have been permitted to quote it from advance proof sheets by the kindness of Dr. Knapp. In September, 1888, he had an apoplectic attack with left homonymous hemianopsia, not accompanied by other symptoms. In August, 1889, there came another attack with complete homonymous hemianopsia of the opposite side. The whole of both visual fields was destroyed, except a central space in each eye measuring 2° or 3° in diameter. He had retained as the issue of his first attack vision of $\frac{9}{12}$ and $\frac{5}{36}$ in the respective eyes, and this was not made worse by the second attack.

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* Graefe's Arch. für Ophth., vol. xxxvi., Abth. 1, 1890.

† Archives of Ophth., 1891.

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Within these fields there was correct color perception. Over the right half-fields, the seat of the last attack, there was some perception of light. By the ophthalmoscope nothing abnormal was to be seen.

Still another case is given by Moeli,* which occurred in a man affected by dementia paralytica. He had double hemianopsia at successive periods, but on account of his defective mental state an accurate examination of his fields could not be made. But it was evident that he could see within a very small field.

A case by Bouveret † of double lesion of the occipital lobes was so soon followed by death as to preclude careful examination of vision. No other functions were damaged. It is not easy to explain the remarkable facts of these cases. Evidently no explanation can be based upon the anastomosis of optic nerve fibres in any of the peripheral parts of the visual apparatus. We have to do with the preservation of that region of the cortical visual centre which supplies the macula lutea. It has been an open question whether the cortical visual region corresponds topographically to the retina and field of vision, and only within four years has any positive evidence been gained. The case published by Hun showed that lesion of the lower half of the cuneus causes loss of function of the upper quadrant of the retina of the same side—*i.e.*, the lower quadrant of the corresponding field is darkened. The demonstrative character of this case is unquestionable, in regard to a topographical correspondence between the retina and the cortex. Whether the inference can be carried to minute details will be considered presently. The cases of Forster and Schweigger are significant, but not demonstrative. Even should an autopsy be obtained in either it would probably prove impossible to identify the intact regions of the cortex. How they can remain intact when the remainder of the region has lost

* Archiv für Psychiat., xxii., 1, 101.

† Revue Générale d'Ophthalmologie, p. 481, 1887.

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its nutritive supply is, of course, conjectural. Forster supposes that there must be a special arrangement of vessels to nourish the macular region of the cortex independent of the posterior cerebral arteries, and thinks it may come from fine vessels in the pia mater. An attentive anatomical study of this point might give us information.

There are other cases on record of double hemianopsia, but with no note that any vision remained. More light as to the topographical relation between the retina and the cuneus may come from a counterpart to the cases of Forster and Schweigger.* A healthy man, aged forty-five, suddenly found reading confused and difficult without any impairment of distant vision. He could read Snellen 1, although not easily, and preferred the small words. Color sense was unimpaired. By the ophthalmoscope nothing abnormal was found. There were no cerebral symptoms. Pupils and eye muscles normal; urine negative. By the perimeter there was found a small area of blindness on the right half of each field, just touching the macula, about equal to twice the diameter of the optic disc, and in outline and extent precisely alike. They were delineated by a test object one millimetre square. These isolated twin defects remained unchanged for four years under repeated examinations. Their presence was only embarrassing in near work, and in ordinary vision they were unnoticed. In this case there can hardly be any other explanation of the lesion than that it was situated in the cortex, because it was so minute, and so well defined, and was sudden in its onset. In the medullary (subcortical) substance it would hardly have been so small. Its presence seems to compel the inference that the retina and the cortex answer to each other with a remarkable degree of detail. Further proof is to be found in another case (Fig. 34, Taf. x., Wilbrand). A man, aged thirty-four, had headache for years, the pain not very

* Reported by Wilbrand, loc. cit., p. 5.

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severe and not to be precisely located. No vomiting or nausea. Six weeks before being examined he awoke with serious disturbance of sight, and noticed with closed eyes a brilliant flashing on the right side of each field. V.= $\frac{11}{20}$; the fundus both normal; urine, specific gravity 1.030, but without sugar. By the perimeter was found an insular defect of oval form in each right field on the horizontal meridian, at the same distance in each eye from the fixation point. The patient was seen only once.

Another case by Wilbrand is figured at three successive periods within five years, during which time only slight changes occurred in the homonymous defects. They reached from the fixation point to the twenty-third circle of latitude on the left side. The only symptom was severe headache. After five years sugar appeared in the urine.

In all these cases of small homonymous, permanent, and similar visual defects, unaccompanied by serious cerebral symptoms, the evidence points almost certainly to a small lesion of the medullary or of the gray matter in the visual centre.

The quadrant defects, such as Hun has reported, are not very rare. I have seen two cases. In one it was not exactly bounded, because a perimeter could not be used in the patient's bedroom. He was a large, healthy man, aged sixty-three, a distinguished lawyer. He had for eight years had hyaline casts in the urine, and was accustomed to examine for them with the microscope. Fourteen years previous he had a small hæmorrhage at the macula lutea of the right eye which caused metamorphopsia, but the injury to sight was not permanent, and, while a slight zigzag distortion could be noted in fine parallel lines, the defect was not annoying. In April, 1889, he had a cerebral attack whose symptoms were vague, and which came after he had for two days noticed vortices and muscæ floating before him. I was called to him ten days after and found him much depressed in mind; able to converse intelligently, although speech was

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more than usually slow. He evidently had difficulty in collecting his thoughts. His chief complaint was of confusion of sight and inability to read. There was no paralysis of motion or sensation. There was no headache. There had been pain in the lumbar region. He recognized objects perfectly, could call their names, and remembered the events of the preceding days. His manner was very different from his usual intelligent, although deliberate, character. There was no diplopia; to the ophthalmoscope the eyes were normal. Testing the visual fields with the hand, there was found homonymous hemianopsia of the upper two-thirds of the left side. The defect did not include all of the left lower quadrant, and the boundary line could be moderately well defined. I did not see him afterward. He died about seven months later from evident brain lesion, stated to be with signs of softening. There was no autopsy.

Another case of quadrant homonymous hemianopsia which I have noted is as follows: The defect really includes the upper two-thirds of the right half-fields, taking in 110°. The man, aged forty, printer, seen at the New York Eye and Ear Infirmary in May, 1887. Indulges freely in alcoholic drink, had been a soldier and received various slight injuries. Has scars on the head, one over right parietal eminence, one on each side of frontal bone near fronto-parietal sutures. These were probably received during some of his sprees. Within two years had much headache; denies syphilis and there are no symptoms. On Sunday, May 8th, 1887, after having been drunk, noticed that he did not see objects on his right side. Complained that he was afraid of being run over in the street. On examination found to be very myopic, O. D.—15 D., V. = $\frac{20}{100}$. In the fundus extensive choroidal lesions, both circumpapillary and diffused. In the fields is a homonymous partial sector like hemianopsia on the right side. In the left eye the defect reaches over into the adjacent left side, but here the visual perception remains to a certain degree and is fully accounted for by

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choroidal changes seen by the ophthalmoscope in the corresponding part of the fundus. Patient is also deaf. He has been observed up to September, 1890, and the visual defect remains unchanged. He suffers constantly from vertigo, which might, perhaps, be attributed to his aural disease, were it not that the symptom has appeared since the eye trouble occurred.

In a case reported by Brill* the symptoms were partial hemiplegia and hemianæsthesia on right side, amnesic aphasia and total loss of color perception in both eyes. There must have been right hemiopia, although it was not investigated. The lesion was a softened area at apex and lower part of left cuneus, and in adjacent part of gyrus lingualis. It reached within 1.5 centimetres of tip of occipital lobe. The double achromatopsia has great interest and is to be considered in connection with Verrey's case (*vide infra*).

These cases, because of the absence of other cerebral symptoms, point to a lesion of the mesial portion of the occipital lobe. Sector defects may, however, arise from lesions in other parts of the brain. For example, Schweigger† gives the case of a woman who, after childbirth fifteen months previous, had hemiplegia and slight aphasia and alexia. All these symptoms passed away. There remained a loss of field on the right side of each eye on the horizontal meridian, which included a sector about 20° in breadth. The location of the lesion could not have been cortical exclusively. It may have been subcortical.

A case of sector hemianopsia from tractus lesion is given by Marchand.‡ A student, aged twenty-one years, in blooming health, was examined for myopia and found to have slight double optic neuritis and V. = $\frac{1}{8}$. He was under observation fifteen months and improved in sight nearly to the normal. On his last visit a defect in the upper left quadrant of each eye was discovered. Ten

* American Journal of Neurology, February, 1883.

† Archiv für Ophthal., Bd. xxii., Abth. 3, p. 297.

‡ Graefe's Archiv, Bd. xxviii., Abth. 2, p. 64, 1882.

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days afterward severe headache occurred, some strabismus, vomiting, coma, and death. At the autopsy a glioma was found in the right temporal lobe near the gyrus hippocampi. It encroached on the outer surface of the tractus at its posterior part, which was softened and reddish yellow, while the rest of it was normal. The defect in the field was caused by the lesion of the tractus.

Another and very recent case of quadrant homonymous defect due to lesion of one tractus is reported by Norris.* In this case there were other symptoms besides those of visual disturbance—viz., muscular twitchings, impaired grip of left hand, partial loss of control of left leg, drowsiness, the Wernicke hemianopic pupillary inaction not obtainable, diplopia occurred, and finally complete paralysis of left side. The diagnosis was tumor of the base near the thalamus. At the autopsy a tumor was found at the junction of the right crus cerebri with the temporal lobe. By sections transversely the tumor was found to occupy the white matter within the right occipital and temporal lobes, reaching posteriorly a point just outside the descending horn of the lateral ventricle, anteriorly, and internally at the base it extended to the tuber cinereum and involved the optic tract. Above it reached close to the gray matter of the insula, but did not involve it. It rose about half an inch above the level of the pulvinar; it involved part of the lenticular nucleus, the anterior portion of the internal capsule, and extended laterally to the thalamus. It proved to be a glioma. The complete involvement of the right optic tract in the tumor accounted for the quadrant and otherwise irregular impairment of the visual fields. They were not symmetrical. In the left side more than a quadrant was destroyed, and in the right side almost a half, whose border was both oblique and irregular. The extension of the tumor back into the white substance of the occipital lobe doubtless had much to do with the irregular hemiopia.

* Trans. Am. Ophth. Soc., 1890, p. 470.

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It therefore follows that absolute localizing value cannot be attributed to sector lesions of the fields. Yet the great probability favors the cortex. In this case the optic neuritis was the only sign until the close of the disease of the nature of the mischief, and this had at that time disappeared.

I might call attention to very irregular but symmetrical types of visual defect. They are found in Schweigger's paper and are quoted in Wilbrand. I have some of my own experience. They may be omitted, except certain very peculiar kinds, of which one is noted by Wilbrand and described at length.* A man, age not given, short and stout, who had had glycosuria, complained since October, 1888, of dizziness and frontal headache and confused sight. He could see parts of words, and in faces some of the features would be indistinct or invisible and other features clear. The symptoms increasing, he was confined to bed a few days, and during this time visions constantly presented themselves on *the left side*, both with closed and open eyes. He saw landscapes, heads, cats, furniture, etc. The illusions disappeared in a few days. When carefully examined on November 8th, 1888, pupils, lids, eye muscles, and fundus were normal. There was correctible myopic astigmatism. The perimeter showed left-sided hemianopsia, and by using a small test object five millimetres square it was found that the blind half-fields were composed of innumerable insensitive areas separated by openings through which the object could be discovered. They could not all be mapped out, but one notable scotoma below the horizon is outlined; the heavy, straight, meridian lines show places where the object was seen uninterruptedly. On the 26th of the same month, with increasing general symptoms, an apoplectic attack occurred with right hemiplegia, coma, and death.

Autopsy, twenty hours after. Atheroma of vessels at the base. In removing the brain the hemispheres were torn

* Loc. cit., p. 54, Taf. ix., Fig. 22.

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off at the peduncles, and, while both were fragile, the right peduncle showed distinct yellow softening. The chiasm and tractus were normal. The same was true of the cortex, except at the tip of the right occipital lobe, which was softened. The softening occupied the third occipital convolution on the upper and medial surface, but below it reached forward to the fusiform convolution and the gyrus lingualis. Section disclosed a hæmorrhagic softening, the size of a hazelnut, in the substance of the medullary matter, and the superjacent cortex had undergone yellowish discoloration. There were no lesions of the internal capsule or of the primary ganglia. The concentric limitation of both the right half-fields must be ascribed to the implication of the whole brain, and especially the other occipital lobe, in functional disturbance.

Wilbrand calls attention to the hallucinations which in his case appeared only in the affected half-fields, and quotes similar cases from Henschen and Putzel.* Dr. Petersen has in two papers recently recorded a similar occurrence. The case of Henschen presented lesions of the cuneus and lingual lobe, and that of Putzel involved the cuneus extensively, as well as the internal capsule and the outer border of the thalamus.

In subcortical lesions, as well as in cortical lesions, hemianopsia may be either complete or incomplete; but Wilbrand's case, so far as it goes, indicates that extreme irregularities in the fields are likely to be due to subcortical lesions.

Another feature of hemianopia requires consideration. The function of sight includes three subdivisions: perception of light, of color, and of form. If the first be wanting, all are wanting. Given the first, either or both the remaining two may be lacking. Illustrations of such defects occur in hemianopsia. Hemianopic loss of color sense in both eyes is the most frequent among these

* New York Medical Journal, August, 1890, and January, 1891.

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rather rare cases. Of these Swanzy* enumerates eight in literature, and in one case there was an autopsy. Verrey reports it in *Archives d'Ophthalmologie*, tome viii., No. 4, 1888. A lady, aged sixty, had an apoplectic attack, from which she fully recovered, except from the disturbance of sight. There was found absolute color blindness in the right half of each field, with reduced but not complete loss of light and form sense in the same regions. There was no dyslexia nor mental blindness. During twenty months the condition was found to be the same. Finally she died of another apoplexy. I quote Mr. Swanzy's account of the autopsy: "The cause for death was found in a fresh hæmorrhage in the right centrum ovale and lateral ventricle, while an old hæmorrhagic cyst in the lower part of the left occipital lobe, extending into the temporal lobe on the mesial side, explained the hemiachromatopsia. This cyst was situated between the floor of the posterior horn of the left lateral ventricle and the basal surface of the occipital lobe. It had occupied the white substance of the inferior occipital convolution, and had almost completely destroyed the white substance of the posterior extremity of the occipito-temporal convolutions as well as that of the postero-inferior part of the cuneus. The cyst came nearly to the surface of the cuneus and of the occipito-temporal convolutions, having destroyed the deeper layers of their cortex."

Another case by Siemerling (see Fig. 45, quoted by Wilbrand, loc. cit., p. 144) presented on the right side complete hemianopsia combined with total loss of color sense on both left sides. There was mental blindness, and agraphia and amnesic aphasia. Vision was $\frac{1}{50}$. Within three and a half months vision improved to $\frac{3}{5}$. Color perception returned to the left sides and the mental blindness, alexia, and agraphia disappeared. The right hemianopia continued. There were no other symptoms.

* Transactions of the Ophthalmological Society of the United Kingdom, vol. ix., 1889, p. 23.

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A case of Schöler's* presents on the left side of each field complete color blindness, with the addition in the left half of the right eye of a sector at its lower part where there is no light sense. Patient had bad headache, vertigo, attacks of half-sight, swimming before the eyes. No organic lesions. After three months the defect in lower part of the field of the right eye disappeared, but the loss of color sense in the left half-fields persisted.

The loss of form sense with retention of light sense is to be determined by testing with letters or simple figures held eccentrically. This examination is not readily made, because we have not a standard in habitual use. One may test by holding up fingers. An abatement in form of sense can sometimes be ascertained.†

A case from Schöler and Uhthoff‡ is in point. A man aged sixty-eight, double hemianopsia. O. D., fingers at ten feet; O. S., fingers at twelve feet. Fundus normal. In right eye central opacity of cornea. Seven days previous was attacked by severe pain and congestion in the head, until his face became dark red; was blind in both eyes for twenty-four hours, and sight gradually increased to the present amount. Is badly nourished, has dyspnœa. Has stenosis of aortic valves, radial pulse irregular and slow, emphysema of the lungs. Has total loss of color sense in both eyes (no defect formerly). In the right half-fields and in the upper sector of the left half-fields has lost the form sense. In the parts just indicated has light sense, as well as in the rest of the fields. In these parts has subjective flashing which he compares to the rustling of wind in the leaves. Under treatment light sense grew brighter. Had several attacks of headache and vertigo, and temporary blindness. Sight improved until in the eye with corneal opacity vision became $\frac{14}{200}$, in the other $\frac{1}{5}$. He died of heart disease a little more

* Bericht, 1884, p. 64.

† See cases in British Medical Journal, November 23d, 1889.

‡ Bericht, 1884, p. 69.

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than six months later. The visual fields remained the same.

A case by Brandenberg* presented right hemianopia, amnesic alexia of a peculiar kind—viz., he could not read words, but could count figures. The hemianopic loss of sight had respect only to perception of form, but not to perception of light. There was also reduced color sense in the remaining half of the fields. The fourth nerve was paretic, and on this account it was believed that a double lesion existed.

The centres for form, light, and color sense are all in the cortex of the occipital lobe. Wilbrand places them one above another: light sense external, form sense intermediate, color sense internal. In this view Reinhardt concurs. Others—viz., Verrey, Seguin, and Nothnagel—think them to be side by side. As Swanzy says relative hemianopsia can only occur with lesions of the cortex, hemianopsia from lesions elsewhere must always include all the visual perceptions. Those cases of hemianopsia accompanied with some peripheral contractions of the other side of the field are due, according to Swanzy, to cortical lesions. A case by Oliver† indicates that this opinion may be erroneous, and the case is extremely interesting from the precision with which the visual symptoms were studied and made to furnish evidence of localization. The earlier symptoms were headache, vertigo, temporary blindness during two years and then followed by spasm of the hand, arm, and to a less degree of the leg. There was right lateral hemianopsia. Three weeks later the remaining half-fields became extremely contracted, this contraction most decided for the left eye. Vision $\frac{5}{40}$ O. U. Hemianopic pupillary inaction plainly elicited and showing interference with the sensory motor arc of the pupils. A hæmorrhage into the right optic disc. Diagnosis: "Taken in connection with the right

* Graefe's Arch. für Ophth., xxxiii., 3, 96, 1887.

† Transactions of the American Ophthalmological Society, 1890, p. 479.

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hemianæsthesia and right hemiplegia, the ocular changes probably place the lesion near or in the left optic thalamus (pulvinar)." Autopsy revealed a tumor invading the external portion of the left optic thalamus, as well as the corpus striatum almost as far as its anterior third. The capsule was not invaded. The left optic tract as far forward as the chiasm was markedly flattened and pressed upon. The right brain was normal. The tumor was hard and proved to be a glioma with commencing sarcomatous degeneration. The same remarks may apply measurably to subcortical lesions. But we are apt in such cases to meet with decided distant symptoms in hemiplegia, hemianæsthesia, ocular paralyses, etc.

A symptom often concomitant to occipital lesions on the left side has been referred to—viz., mental blindness, and with it amnesic aphasia may concur. It is not necessary to enter into any description of it. But that its locality has been pretty nearly determined is proven by the case of Macewen.* A man who had received a severe injury a year previous suffered from deep melancholy and homicidal impulses and paroxysms of headache of indefinite seat. The only localizing symptom was mental blindness, which immediately followed the injury and lasted only two weeks. Acting upon this hint, the skull was trephined. It was found that a depressed portion of the inner table of the bone pressed upon the posterior part of the supramarginal convolution and the anterior corner of the angular gyrus. When the bone was restored to place the mental condition of the man was greatly relieved. This case gives more precision than any yet published to our knowledge of the region in which to look for the visual memory of objects. I do not find any other approaching it in this regard, except one referred to by Gowers,† in which a lesion is located at the angular gyrus of the left hemisphere (reported by Chauffard), and is

* British Medical Journal, August 11th, 1888.

† "Diseases of the Nervous System," p. 463, American edition.

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said to have caused complete mind blindness during the short time the patient lived. For a list of cases, nine in number, in which this symptom was present in greater or less degree, see Starr, "Familiar Forms of Nervous Diseases," 1890, p. 64. See also Wilbrand, "Die Seelenblindheit."

A case of Deutschman's* has interest. A boy, aged fifteen, was kicked by a horse upon the left side of the head. Amnesic aphasia occurred, which disappeared in about a week. Then, examined by Prof. D——, complete right-sided hemianopsia was found, including light, form, and color sense, and going through the fixation point. In sixteen to eighteen days this passed away and the power of reading became normal. The explanation is thought to be a superficial clot at first compressing the speech centre and settling down afterward upon the visual centre, and when absorbed, function was restored.

Recoveries from hemianopsia are recorded, and even from double hemianopsia (see *British Medical Journal*, Mr. Lang, November 23d, 1889). When distant symptoms coexist recovery is not so likely as when these complications are absent.

It would be an unwarrantable omission to say nothing of the behavior of the pupil as aiding the localization of hemianopsia. See Leber in "Graefe and Saemisch Handbook," 1876, Bd. v., iii., 941. Wernicke and Seguin have dwelt upon it. Briefly, it is that while in lesions behind the primary ganglia the pupils may act sluggishly, they will respond if light be thrown upon the blind side of the eye. When the lesion is at or in front of the primary ganglia the reaction of the pupil is suspended for the blind halves of the fields.

Swanzy says: "Loss of the pupillary reflex to light, apart from cases of paralysis of the third nerve, is a sign of lesion of the anterior quadrigeminal bodies or of the optic tracts, and may be utilized to distinguish these lesions

* Beiträge zur Augenheilkunde, 1890, p. 31.

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from others, which may cause loss of sight by implicating both visual paths beyond the corpora quadrigemina, or both visual centres; for in such cases, notwithstanding the amaurosis, the pupil reflex is maintained. Gudden's investigations* showed that there are special afferent fibres in the optic nerves and tracts for the pupil reflex, distinct from those of vision.

"In cases of hemianopsia, similarly, the pupil reflex serves to establish a diagnosis between a lesion in an optic tract and one further on in the visual path, or in the visual centre, of the same side. For, if the pupil contracts actively to light concentrated on the blind side of the field, the lesion cannot be in the tract; but if it does not react, the lesion must be in the tract."†

A notable instance which emphasizes this indication is related by Wernicke (the case was seen by Brieger).‡ A girl, aged nineteen, presented the following important symptoms of focal lesions: Slight hemiparesis of left side, anosmia and total blindness, with double choked discs. The pupils moderately dilated and acting imperfectly under diffused daylight. The blindness, therefore, could not proceed from the optic nerves, but from a central cause, and must be regarded as a double hemianopsia. Anosmia could be looked upon, like the slight hemiparesis, as a distant symptom and be left out of view in localization. Tumor of both occipital lobes was the diagnosis. At the autopsy there was found a tumor in the right temporal lobe which had caused softening in the right occipital lobe, but the left occipital was entirely free. This accounted for the left hemianopia. The right hemianopia was explained by finding a blood vessel across the left tractus, where it had made a deep furrow and given rise to tissue degeneration. A correct diagnosis of the case might have been made during life if the

* Sitzungsber. d. Münch. Ges. Morphol. u. Physiol., 1886, p. 168.

† The Localization of Cerebral Disease, Trans. Ophth. Soc. of the United Kingdom, vol. ix., p. 18, 1887.

‡ Tome iii., p. 336.

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peculiar hemianopic pupillary inaction* had been looked for. This can only be made out by examination with a single light in a dark room, and the light must fall quite obliquely lest by diffusion the sensitive side of the retina be stimulated.

I have omitted detailed reference to other symptoms which appear with hemianopsia, such as the various kinds of paralysis of sensation and motion. They belong to a discussion of cerebral pathology, and my aim has simply been to give prominence to visual disturbances and point out how a more critical observation may render them more productive of information as to the nature of a cerebral lesion.

The points set forth may be thus summarized:

1. The want of uniformity in the exact location of the boundary between the blind and seeing portions of the fields in hemianopsia.

2. The continuance of a small central field in each eye two or three degrees in diameter, in certain cases of double homonymous hemianopsia.

3. Sectorial defects, homonymous in character, are most likely to have origin in the cortex of the occipital lobe, usually in the neighborhood of the cuneus. In these cases there may be absence of other significant symptoms, except possibly agraphia, mental blindness, alexia.

4. Sectorial defects may have origin in the subcortical substance of the occipital lobe, but the defective portions of the fields are not likely to be so well defined in boundaries as in 3, and the loss of light sense will be less complete; there may even be irregular spaces where light is recognized, mingled with blind spaces. In these cases hemiplegia, hemianæsthesia, etc., if present, signify proximity of the lesion to the anterior part of the visual radiation of Gratiolet.

5. Sectorial defects, quadrants, or other figures can

* This phrase is truly descriptive of the facts and to be preferred to "hemiopic pupillary reaction," which is misleading.

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arise from lesions of the tractus (cases of Marchand and Norris), but will be accompanied by other significant symptoms pointing to the temporal lobes or to the base, such as paralyses or anæsthesiæ, etc. In these cases, as in all cases of tractus lesion, the blind region includes loss of light, color, and form sense.

6. Loss of either color sense or of form sense, with preservation of light sense, implies lesion of the cortex of the visual centre, either direct or indirect.

7. The hemianopic pupillary inaction signifies that the lesion is at the middle ganglia of the brain, or in front of them—viz., along the tractus, chiasm, or optic nerves.

8. It is certain that a topographical correspondence exists between the cerebral visual centre and the retina, and that it is precise and extends to details. Hun's case proved that the lower part of the cuneus corresponds to the upper part of the opposite halves of the retinæ, and Wilbrand's cases corroborate Hun's and carry the relationship to smaller regions in the respective localities.

NOTE.—The perimeter of Priestley Smith is, for convenience of manipulation and of registration, to be preferred, while the small hand perimeter of Schweigger is portable and suited to bedside examinations.

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*Stated Meeting, February 19th, 1891.**

THE OPERATIVE SURGICAL TREATMENT FOR ANEURISM OF THE FIRST TWO PORTIONS OF THE SUBCLAVIAN.

By JOSEPH D. BRYANT, M.D.,

NEW YORK.

YOUR chairman addressed me, not long since, a somewhat urgent request, tinged with a coloring of entreaty, asking if I would contribute to this meeting of the Section a paper on the subject of which, I fancy, he hoped a profitable discussion might make amends for the various brevities of the exciting cause of the debate.

The subject of discussion selected, "The Operative Surgical Treatment for Aneurism of the First Two Portions of the Subclavian," is not at all new in the idea, though perhaps differently expressed than before. I desire to say at this time that you will not be plagued by the announcement of the employment of any strange expedient of treatment of my own, nor, in fact, of a startling or unusual result of treatment. The suggestive stimulus of a recent case of mine that was thought to bear on the title of this paper, is offered in part as the reason for it, and the history of the case will be employed as a text from which it is hoped useful conclusions may be drawn.

Mary D——, possessed of average intelligence, aged fifty-five, was admitted to Bellevue Hospital August 16th, 1890. On admission an examination showed the existence of an aneurismal tumor, extending about one inch and a half above the right clavicle, behind and nearer to the

* In charge of Section on General Surgery.

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outer side of the sterno-cleido-mastoid muscle. From this situation it extended obliquely downward to the episternal notch, thence behind the sternum, although not pressing against it. Percussion at and around the immediate neighborhood of the right sterno-clavicular articulation disclosed a marked degree of dulness. The personal and family histories of the patient contained nothing suggestive, except perhaps a prolonged attack of acute articular rheumatism, from which she had recovered a year or so before admission. No specific history. She complained of constant pain, fulness, and throbbing, which had existed with varying intensity for several weeks before admission, at the seat of the tumor. The fingers could not be pressed between the tumor and the clavicle or the sternum, on account of the size of the growth. Huskiness of the voice was marked, and had continued with varying degrees of severity, without the presence of the usual assignable causes of it, for some time prior to admission. The tumor was first noticed ten weeks before admission, at which time it was about one-half as large as on entrance to the hospital. Occasional attacks of nausea, dizziness, and headache, with ringing in the ears and flashes of light, followed from the time of the discovery of the tumor up to the present date. No evidence of organic disease was discovered. The pulsation of the radial artery of the right was appreciably weaker than that of the left side. A soft bruit, but no thrill, was present. A somewhat indefinite history of previous slight laryngeal spasm was elicited. No difficulty in deglutition or respiration had occurred, due to direct pressure.

The patient was placed in bed and put on a low diet combined with iodide of potassium in large doses. At the end of the first month the tumor appeared to be smaller—certainly it had not increased in size. At this time it was examined by Dr. E. G. Janeway and Dr. A. A. Smith, with the view of confirming the suspected site. The first portion of the subclavian, with probable involvement of the innominate, was deemed to be a discreet and

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rational diagnosis in this respect. The treatment was continued, with ever-varying belief as to whether or not the tumor were larger or smaller, harder or softer, than on a previous occasion. The element of doubt in these cases frequently staggers belief; and it seems not improbable that the author of the sentiment, "Who never doubted, never half-believed," was a consulting physician in such matters, and coined the sentiment for selfish and politic purposes only.

On November 14th the patient had a sudden and severe attack of dyspnœa, attended with nausea, vomiting, ringing in the ears, flashes of light, and great cyanosis. Just subsequent to this attack she was examined by Dr. Stephen Smith and Dr. Dennis, who concurred in the diagnosis already made. Three other attacks of a similar nature, though less severe, happened during the next month. These attacks were apparently mitigated by the use of chloroform and nitrite of amyl. No appreciable changes in the size or shape of the tumor attended these obstruction manifestations. As the result of the preceding consultations it was decided to tie the common carotid and subclavian arteries, either simultaneously or with an interval, as might seem proper after ligature of the carotid. On December 20th the common carotid was tied, immediately above the omo-hyoid, at a clinic given in the Bellevue Hospital amphitheatre. Slight loss of power of the right side of the face, unnatural dilatation of the right pupil, and dizziness were the only important cerebral manifestations of circulatory interference that followed the ligaturing, and all of these disappeared within the first week after the operation. During the first week it was noted: 1. That all evidences of the previous long-continued hoarseness had disappeared. 2. That the patient's sensations of pain, fulness, and throbbing at the seat of the tumor were no longer complained of. 3. That the tumor appeared to be smaller and firmer.

Toward the end of the second week the tumor was again examined by Dr. Stephen Smith, who unhesitatingly

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expressed the opinion that it was much reduced in size and increased in density. Twenty days after the ligature of the carotid the tumor had disappeared almost entirely from behind the posterior border of the sterno-cleido-mastoid, and, without extending higher, had advanced toward the median line of the neck, entering further into the inferior carotid triangle. However, the tumor appeared smaller, and the dulness first noticed at and about the sterno-clavicular articulation was much diminished in area and lessened in intensity.

On January 17th (four weeks after ligature of the carotid) the subclavian artery was ligatured at the third portion. Nothing unusual followed as the immediate result of this operation. This vessel, like the carotid, was tied with an ordinary good-sized catgut ligature. Both wounds healed throughout, by first intention, at once. One week after the last operation the patient expressed herself as comfortable in all respects. On the eleventh day, however, while the tumor was being examined, the patient complained suddenly of a severe pain in the right side of the head, which was followed quickly by nausea, vomiting, and well-marked ptosis of the right eye, together with right myosis. The day following, the pain and vomiting continued, the stomach rejecting all alimentation. The respirations became hurried, attended with small, moist râles in the right lung. On the thirteenth day the patient died. The result of the autopsy in all of the details is well expressed in the following statement of Dr. Herman Biggs, who made it:

"The heart seemed of about normal size and showed only moderate sclerotic and fatty degeneration in the myocardium. The mitral valves were nearly normal, and the aortic valves, though slightly thickened, were perfectly competent. The aorta was the seat of very extensive chronic deforming endarteritis, as shown by numerous patches of atheroma, atheromatous ulceration, sclerosis, calcification, etc. This process was more marked in the thoracic and abdominal aorta than in the arch of the

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aorta, and extended from the aorta into the smaller vessels to a moderate degree. There was a dilatation of the ascending and transverse portion of the aortic arch along its external convex surface. Some idea of the amount of this dilatation may be gained from the transverse measurement of the vessel. After opening the aorta the transverse measurement of the aortic lumen, just above the valves, was three and one-half inches. One inch and a half higher up it was four and one-half inches, and at the origin of the innominate artery four inches. The innominate itself was also considerably dilated, especially near its origin, where its circumference was one-half inch greater than just below the bifurcation. There was a firm thrombus in the right common carotid, situated one and one-fourth inches from its origin. Surrounding the third portion of the right subclavian artery was a heavy catgut ligature, and on either side of this was a firm thrombus. In the right vertebral artery, one-half inch from its termination in the basilar, was a thrombus (which seemed to have formed around an embolus) which completely obstructed the vessel. Beginning in the lower part of the floor of the fourth ventricle, on the right side, was an area of softening that extended upward nearly through the pons. In the right hemisphere of the cerebellum, also, was a large area of softening which involved nearly the whole of the centre of the hemisphere. The arteries of the circle of Willis and their branches presented the lesions of an advanced endarteritis. Fibrinous deposit had not taken place within the aneurism at any portion of its surface."

There are some facts in connection with these findings that appear to deserve special attention at this time.

1. The actual location of the aneurismal changes as compared with their supposed site.

The presence of the tumor above the clavicle, and behind the sterno-cleido-mastoid, pointed to disease of the subclavian, which, when taken in connection with the hoarseness and laryngeal obstruction symptoms, and the

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dulness at and about the right sterno-clavicular articulation, seemed at that time to make the localization element of the diagnosis almost certain. The sequel, however, only serves to emphasize the fact already enunciated, that a correct diagnosis of the location of aneurismal tumors at the root of the neck is an impossibility, except in special cases.

2. The absence of stratified or other thrombi within the sac of the aneurism.

The well-marked diminution of the size of the tumor and the increase of its density, which followed ligature of the vessels, were thought to have been due to fibrinous deposit. These changes encouraged the belief on the part of all those who examined the growth that a definite curative process, due to fibrinous deposit, was taking place. However, such appears not to have been the case. And in this connection I will mention a most striking fact that was noticed, after ligature of the carotid, by those to whose attention it was called. Immediately after the ligature of this vessel the circulation of the right subclavian was arrested at the third portion by pressure of the thumb, with the view to determine its effect on the size and tension of the aneurism. Certainly this act did not, so far as I could discover, cause the least increase in the size and tension of the growth; in fact, it seemed to me as if the size were diminished by the manipulation. Being unwilling to rely on my own sense of touch in this matter, I asked Dr. Banks, the house surgeon, to make the test, and did so without speaking of the impression it had made upon me. After repeated trials Dr. Banks asserted positively that the aneurism was lessened in size by the arrest of the circulation in the subclavian. This did not satisfy me. I then requested Dr. Banks to command the subclavian, while my own fingers were applied to the growth with my back turned to the patient. With these precautions I would have no means of knowing whether the circulation were arrested or not by the doctor's manipulations. I then endeavored to tell, by the

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impressions conveyed to my fingers by the growth, whether or not the circulation were arrested in the subclavian, basing my belief, of course, on the appreciation of the varying size of the tumor as modified by the pressure manipulations. To my astonishment, and to the amusement of those present, my predictions were amiss, for when I declared the tumor the smaller the circulation was arrested; when the larger, it was uninterrupted. Some days after this time I asked Dr. Stephen Smith to make the test and express his opinion of the matter. After a careful trial Dr. Smith was unable to note an appreciable change in the size of the aneurism due to interruption of the subclavian circulation. If the initial observations were true, then surely a lessening in the size of aneurisms may happen when similarly circumstanced, even though no fibrinous deposit ensue. Whether or not these impressions were genuine or delusive can be determined only by a more careful study of subsequent cases.

3. The fatal thrombus of the vertebral artery.

The brain softening following the plugging of the vertebral was the immediate cause of death, consequently brief attention to this phase of the case is important as bearing on the ligature of this vessel in the course of treatment of aneurisms amenable to it. At one time I had entertained the self-proposition in this case to tie the vertebral at its association with the atlas, after allowing sufficient time to elapse to have gained all that might arise from the collateral relations of its cervical branches with important contiguous vessels. This case demonstrates the result that would have followed had the proposition been deferred six weeks after ligature of the common carotid. The proposal to tie this vessel, after a longer or shorter period following ligature of the innominate and common carotid simultaneously, is made especially significant in old people by the result of this case. However, the dangers attending the Charybdic shoals of supplementary measures in aid of innominate ligature are

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not less momentous than the inevitable Scylla-like results of the cases demanding it.

4. The gradual forward change in the position of the supraclavicular portion of the aneurism, which followed soon after ligature of the common carotid, is in no way explained by the post-mortem examination.

In selecting the title of the paper I was actuated also by a desire to have considered at this time the better plan of procedure in aneurismal growths so situated as to admit of either of two procedures—viz., ligature of the innominate artery, or distal ligature of the common carotid and subclavian arteries, either simultaneously or consecutively. The importance of such a decision is obvious, more especially if it shall appear that the latter proposition affords an equal relief from suffering with an equal saving of life, since its performance can be easily accomplished by any one having an ordinary well-founded surgical attainment. It is fair, too, in this connection, to add to either of these procedures other expedients that may be thought to exercise an equal influence in contributing to the necessities of both. The further consideration of the subject will be continued under the following titles: 1. What is the lease of life of those afflicted with aneurism of the first two portions of the subclavian, when treated by measures that may be employed by physicians and surgeons alike? 2. What is the lease of life when treated with distal ligature of the subclavian and carotid, (*a*) when simultaneously applied, (*b*) when applied consecutively? 3. What is the lease of life with ligature of the innominate? 4. What operative expedients may be employed that can be thought to exercise an equal influence in contributing to cure, with either the distal or proximal methods of ligaturing. 5. Conclusions.

It is, indeed, practically impossible to find reports of a sufficient number of undoubted cases of aneurism of the first two portions of the subclavian, together with innominate involvement even, from which to make a reliable statement as to the results of distal and proximal ligature,

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when compared with "no treatment," and with treatment employed by physicians alone in such cases. Therefore it is deemed wiser to inquire as to the lease of life in cases of subclavian aneurism when treated by precautionary, medicinal, and manipulative methods only, all of which a physician may readily employ.

It is assumed that no patient has yet died of aneurism who had not been subjected to some variety of treatment; provided, of course, that the case had fallen under the timely scrutiny of medical observation. Precautionary treatment may be said to include regulation in dietetic and physical matters; in fact, it is often, though improperly, denominated as "no treatment." Mr. Poland's twenty-two cases with Mr. Barwell's nine cases, in all of which rest and regulated diet comprised the means employed as treatment, may with propriety be presented as reasonably answering the question, at this time, as to lease of life without operative interference. Two of these thirty-one cases recovered slowly, presumptively as the result of treatment; two recovered quickly, probably as the result of incidental fixation of a clot; the remaining twenty-seven died, or at least received no benefit. According to these figures it appears that about thirteen per cent of the cases recovered, one-half of which were cured by the treatment itself. Strict regimen, with rest and occasional venesection, are credited with one direct and two coincidental cures in thirteen cases. The methods by proximal compression, direct compression, and also by parenchymatous injections of ergotin, have not been employed singly in a sufficient number of cases to warrant their precedence of the other methods just mentioned. However, they may with propriety be classed as medicinal and manipulative measures, calculated to aid the milder ones in the establishment of a cure. It now appears that of the forty-four cases that were treated by medical methods, seven, or about sixteen per cent, were cured, three of which were direct and four coincidental cures. If to this result be now added those obtained by

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direct pressure and the ergotin injections, we have a total of fifty cases, of which nine, or eighteen per cent, were cured, five of which were direct cures and four coincidental ones. The reports of distal ligature of the subclavian and carotid arteries, either singly, simultaneously, or consecutively performed for aneurism at the root of the neck and for subclavian aneurism, do not furnish a sufficient number of isolated cases of distal ligature for aneurism of the first two portions of the subclavian, or of the entire vessel, to enable one to judge of its worth in this respect from recorded experience.

Of forty cases thus far examined from the original reports, at my request, by Dr. Glover C. Arnold, in which distal ligature had been employed for aneurism at the root of the neck, but one or two can be crowded even into the category of aneurism of the first two portions of the subclavian. It is not because this variety of aneurism does not occur, but because of the uncertainty of diagnosis they are relegated to the broader and self-evident site—the root of the neck. As to distal ligature for aneurism at the root of the neck, nothing remains to be said after the admirable paper on this line of thought recently read before the Surgical Society by Prof. T. M. Markoe. In this paper Prof. Markoe recorded seventy-four cases. To these can now be added the one of my own, which was the predisposing cause, at least, of this paper.

Little favorable can be said of the lease of life with ligature of the innominate. No household word is more familiar than is the result of this operation to the medical profession. This vessel has been ligatured twenty-four times at least. Fifteen of these cases survived the operation an average of nearly nineteen days each, the longest period being sixty-seven days, the shortest twelve hours. The great majority died of secondary hæmorrhage that happened at or about the time of the coming away of the ligature. A few succumbed very soon after the operation from complications directly incident to its performance.

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The well-known case of Smyth, of New Orleans, survived the operation, narrowly escaped the usually fatal result, lived ten years, then died from rupture of the re-formed aneurism, the result of reverse collateral circulation. Among the recent cases may be mentioned Thomson's (1882), which died of hæmorrhage on the forty-second day; Banks' (1883), which died from the same cause at the end of the thirty-seventh day; also Bull's (1884), which died on the thirty-third day from hæmorrhage. The later cases possess unusual significance, since they were performed not only by representative surgeons, but also with the aid of the highest known art of antiseptic technique. Surely the fatal termination has been much longer deferred by modern methods, but still secondary hæmorrhage claims its own with an assurance that as yet admits of no rebuff. The improvements in the physical characteristics of the ligature, and in the methods of its application, are now quite sufficient to justify the operation, provided it be possible to obviate the pernicious influences arising from the contiguous and persistent blood current distal to the ligature and those resulting from diseased arterial walls. It is of special interest in this connection to notice the condition, respectively, of the innominate, subclavian, carotid, and vertebral arteries, and the sac, as found after death from ligature, in the very few cases thus fully reported.

Bland's case (1832) died of hæmorrhage on the eighteenth day. The innominate and carotid were closed by solid clots; the subclavian open; the vertebral and sac not mentioned. Bickersteth's case (1868) died of hæmorrhage on the sixth day. A firm clot was in the innominate at the cardiac side of the ligature; subclavian occluded; carotid open and the seat of hæmorrhage; vertebral and sac not mentioned. Thomson's case (1882), ox-aorta ligature, died of hæmorrhage on the forty-second day; innominate, subclavian, and axillary arteries firmly closed; carotid closed by a clot with a soft centre; all branches of the first portion of the subclavian were pervious. The

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sac was lined with fibrinous layers to the depth of one-third of an inch, and newer layers appeared to be forming. In Bull's case (1884) the right common carotid and the right vertebral arteries were ligatured simultaneously with the innominate with a double catgut ligature. This patient died of hæmorrhage from the cardiac side of the innominate ligature on the thirty-third day. The innominate stump was closed with a soft clot, which was continuous with one in the aorta. The calibre of the innominate stump was twice the usual size, the walls were thickened and contained patches of fatty degeneration. The carotid was closed by a firm clot for three inches; the clot of the vertebral was not firm, and the end of this vessel was embedded in a mass of granulations. The aneurismal sac embraced the second and third portions of the subclavian, was about the size of a duck egg, and contained bloody pus and disintegrating clots. In only one other case noted, Gore's (1856), is mention made of the contents of the sac, and this in the following language: "The sac was contracted and filled with coagulum." This case had died on the seventeenth day from hæmorrhage. But one rational inference can be drawn from the failure to mention the existence or non-existence of recently formed fibrinous stratifications in the aneurismal sacs of other cases; if looked for, they were not present, for surely if they had been their presence would have been hailed with delight and heralded as glad tidings of surgical joy. The fatal hæmorrhage in Thomson's case took place from an ulcerated opening at the point of bifurcation of the innominate, which involved the anterior portions of the walls of those vessels. If we again turn our attention to the successful case of Smyth (1864), the reasons for this success will become more apparent in view of the site of the fibrinous clots in the fatal cases just quoted, and the situation of the ligatures that caused their formation.

Smyth ligatured the innominate a quarter of an inch below the point of bifurcation, also, at the same time, the

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carotid an inch above its point of origin. On the fifteenth day hæmorrhage took place, but was controlled by direct pressure. Hæmorrhage occurred again on the thirty-third and fifty-first days, and the vertebral artery was tied on the fifty-fourth day. Following this the patient recovered and lived for ten years, as before stated. The success in this case appears to have been due only to the control of the blood current in the subclavian, as obtained by the consecutive ligaturing of the carotid, and, later, the vertebral artery. If a repetition of these expedients were to secure a similar result with measurable certainty, then indeed they are more justifiable to-day than in 1864, since the technique of to-day will contribute in not a small degree to a favorable issue.

The operative expedients that may be employed, that can exercise rational and reasonably safe influence in contributing to cure in either the distal or proximal methods of ligature, are few indeed, and cannot as yet be given an undisputed prominence. I shall speak of but two at length—viz., galvano-puncture and the recent method advanced by Macewen. Barwell reports three cases treated by the former method, one of which was cured, the remainder not benefited. Ciniselli collected fifty cases of aneurism treated by this method, of which twenty-three were successful, twenty failed, and seven died; surely forty-six per cent of recoveries by one means alone is a most satisfactory accomplishment. It is fair to say, however, that no mention is made of the size, location, and other important characteristics of these aneurisms in the report consulted by me. It is likewise proper to add that the after-treatment in these cases—viz., pressure, rest, ice, etc.—may have contributed to the cure quite as much as the method itself. However this may be, the results are extremely satisfactory, and the treatment is worthy of repetition. The introduction of metallic substances into the sac offers but little hope of cure; but whether or not the employment of the electric current at the same time will not prove acceptable remains to be determined. The

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method of Macewen, as set forth by himself in his recent address on aneurism, published in the *British Medical Journal*, November 15th and 22d, 1890, together with the results obtained in the four cases operated on by him, is deserving of special attention, inasmuch as this expedient can be employed with possibly equal advantage in connection with both the distal and proximal ligaturing of subclavian aneurism. At all events, the good claimed for it can be properly sought for after distal ligature of the subclavian and carotid arteries. The aim is to cure by the induction of the formation of white laminated thrombi within the sac—in other words, to endeavor to stimulate the efforts of nature in the production of the consecutive layers of fibrin that characterize nature's cure. For this purpose he employs a strong, round pin of sufficient length to traverse the dimensions of the aneurism. The diameter of this pin is proportionate to the thickness of the tissue through which it is to be passed while entering the aneurismal sac, always remembering that the smallest size consistent with the necessary penetrating power should be employed. It is pushed into the aneurism and carried to the opposite surface of the sac, and no further. The end is then caused to irritate this surface by manipulations of the operator or by movements caused by the blood current—by the former agency if the penetrated wall be thick, by the latter if it be thin. Ten minutes' application at one point appears to be quite sufficient for the purpose; then the direction may be changed again and again, and the process repeated until, in fact, the entire opposite internal surface has been acted upon. As yet I have not had personal knowledge of the employment of this measure, but certainly I should have no hesitation in using a method bearing the approval of so able a teacher as Macewen, especially when emphasized by the results he has thus far secured by its use.

The first case was one of advanced thoracic aneurism. It had flattened the trachea by pressure and threatened life from dyspnœa. The pins were employed in the

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manner just described, at a few days' interval, on several occasions being retained frequently in the sac for twenty-four hours—at one time for forty-eight hours. Considerable consolidation followed, but the patient died from dyspnœa at the end of one month. At the autopsy it was found that two-thirds of the interior of the aneurism was filled with a firm, white, laminated thrombus. It was thickest at the portion to which the pin point had been applied; thinner at the portion where the pins had entered; thinnest at the portion unirritated.

The second case was an aneurism of the upper part of the right femoral, involving the external iliac, which measured five inches in diameter. Pressure was applied to the common iliac until pulsation in the sac had entirely ceased. Then a long steel pin was passed, in the manner before described, to twelve different parts of the sac, with intervals of ten minutes each. The pin was then removed entirely, and pressure over the single puncture was made for about five minutes. Within two hours the walls were firmer, and at the end of two months the aneurism was entirely cured.

The third case was one of the upper part of the abdominal aorta measuring about three inches in circumference. The pin irritation was applied to this case on three separate occasions. At the end of a month the tumor could be determined only with great difficulty, and then seemed to be like a hard mass raised by the aortic pulsations. The patient, an engine driver, returned to his labor, and two and a half years later seemed to be in good health.

The fourth case was an intrathoracic aneurism of the subclavian, attended with great pain, numbness, œdema, and loss of power in the left arm. The sac was four inches in depth and three in width. In this case the pin was permitted to remain nine hours in the sac, although frequently changed at the point so as to irritate the surface thoroughly. This measure was repeated four times in all, with an interval of seven to fourteen days. As the

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result of these sittings, and of several subsequent ones, the treatment was discontinued, owing to the great thickness of the sac walls preventing the introduction of the pin. Eight months after the first treatment the patient was in good health and free from pressure symptoms. If these successes can be duplicated in similar cases, then, indeed, a new and valuable expedient of treatment has been presented for the relief of the unfortunate.

Conclusions.—1. The lease of life gained by the so-called medical treatment of subclavian aneurism emphatically teaches that its employment should precede all other methods.

2. The lease of life following distal ligature of the subclavian and carotid arteries, for the cure of aneurism of the first two portions of the subclavian, cannot as yet be estimated because of the paucity of these cases that have an undoubted diagnosis.

3. The lease of life following ligature of the innominate alone, for subclavian aneurism, does not justify the operation; but ligature of the innominate, when supplemented with simultaneous and consecutive ligature of the associated contiguous arteries, or by other expedients equally well intended to aid the cure, is worthy of favorable consideration.

4. The lease of life gained by the pin-irritation method of Macewen, and galvano-puncture with its associated treatment, warrants a strong belief in the special benefits of these expedients when employed singly or with ligaturing.

DISCUSSION.

Dr. J. A. Wyeth said that the most enthusiastic surgical operator would admit, from the synopsis of cases given by the author of the paper and from careful study of the statistics, that deligation on the cardiac side for the cure of aneurism of the first and second portions of the subclavian artery was fraught with the gravest danger, while deligation on the distal side of an aneurism, either of the carotid, or of the subclavian, or of the axillary artery, or of both, must also be considered a dangerous

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procedure. The study of these cases would show that death had followed in every instance in which the innominate artery had been tied for aneurism, and that death had occurred soon after, and as a direct result of, the operation, except in one instance, and in this, although the life of the patient was prolonged for about eight years, death had eventually resulted from rupture of the aneurismal sac, the patient bleeding to death from the collateral circulation. Although it did not appear in the paper of the evening, it was a fact that in every single instance in which the subclavian had been tied in its first surgical division death had followed as a result of the operation. It was also proper to state that all deligations of the subclavian artery in its first surgical division had been on the right side, with the exception of the case by Rogers, of New York, who had tied the left subclavian in its first surgical division. It seemed to the speaker that it was a procedure of doubtful propriety to undertake deligation on the cardiac side for the cure of aneurism of this part of the artery until every other means of effecting a cure had been exhausted. Looking over the list of the operations which had been done on the distal side of the aneurisms, it would appear, from the notes at the speaker's disposal, that the axillary artery had been tied for the cure of aneurism in the subclavian in the part in question three times, and that death had followed soon after each operation. One of the patients had died from syncope on the eighth day, another from hæmorrhage on the twelfth day, and a third soon after the operation, the cause of death not being given. The right carotid had been tied five times for aneurism in this position, and death had occurred in every instance. In two other cases in which the carotid and subclavian had both been tied death had taken place, in one on the twenty-first day and in the other in three months, from pneumonia. In twenty-two cases of subclavian aneurism in which no treatment was undertaken there were four spontaneous cures and eighteen deaths. In the eighteen fatal cases three patients had died of other diseases than the aneurism. Of thirteen cases in which the duration of life was noted after recognition of the aneurism, the sum total was forty-seven years and nine months. In fourteen cases treated by the method of Valsalva, with some slight modifications in some instances, seven patients were cured and five died, and two others were improved when lost sight of. The speaker

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had the histories of seven patients—five treated by direct pressure, four of whom were cured and one died; and in addition he had treated one person who had been discharged cured of an aneurism of the subclavian on the right side, the cure having been effected by direct pressure lasting through three months. He had been called in consultation in another case by Dr. Tuttle, and in this direct pressure was tried, and the patient was discharged cured at the end of four months, and had remained cured twelve months, up to the present date, after treatment had ceased. It seemed to the speaker that, with the knowledge of these facts, these aneurisms ought to be treated by direct pressure when possible, such treatment being combined with quiet in bed and the treatment known as that of Tuffnell. Operative interference should only be undertaken when all other measures had failed, or when the danger from hæmorrhage was imminent and it could be controlled by ligating the artery.

Dr. E. G. Janeway sent the following letter: Of the points which you have asked me to discuss, the diagnosis and treatment (medical) of aneurism of the first and second portions of the subclavian artery, I would say: 1. That it is a rare thing for me to be called upon to make such a diagnosis. The diseases which have simulated it have been, so far as my experience goes, aneurism of innominate, tumor usually lympho-sarcoma of soft variety, once Basedow's disease with predominance of goître on the right side; and, on the other hand, I have met one case in which an aneurism of this vessel was supposed to be an abscess, and another of neuralgia from pressure on nerves before the tumor was apparent.

As regards the diagnosis of the aneurism from that of the innominate and from those conditions for which it has been mistaken, I have nothing to offer other than the rules usually adopted. The only remark I would make is that a double murmur occurs both in goître and at times from pressure of a tumor. This rule, that a double murmur of necessity means aneurism, needs a certain amount of limitation.

The treatment of subclavian aneurism usually falls to the lot of the surgeon, even as regards its medical aspect.

The success of the medical treatment of any aneurism is not great, but no better method exists than the use of a modified Tuffnell's, not adopting so great stringency of diet as he employed. Medicines are of service for two

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purposes: first, to quiet the heart's action, and, secondly, to endeavor to promote coagulation in the sac. Morphia or opium is not only useful for the pain, but is also at times the only agent which will, with least injury, quiet a rapidly acting heart. I have given the preference to aconite or gelsemium as cardiac sedatives in cases of aneurism. Digitalis as a remedy, by increasing tension, is liable to do harm. The iodide of potassium in considerable dose, continued, I believe to have some efficacy in promoting coagulation in the sac. Absolute rest, continued for months, should in my judgment be a part of all medical treatment. Special cases may need some medication for symptoms, as anæmia, etc.

One other point and I will conclude: The bowels are apt to become constipated, as a result of the rest and the diet advocated, as well as by the use of opiates where necessary. The straining necessitated by the constipation may do away with the good brought about by rest, etc. Hence the state of the bowels should be carefully inquired after, and, if necessity exists, constipation be relieved by medication.

Dr. L. A. Stimson thought that the difficulty of making a diagnosis between aneurism of the innominate and aneurism of the aorta was often a stumbling block. If the aneurism was not of the subclavian, treatment by the method of direct pressure would be unavailing. He had no confidence in the ligature of the subclavian and carotid for aneurism of the arch of the aorta, but his impression was clear that the result of ligature on the distal side in aneurisms of the innominate and subclavian was far from bad. In a case upon which he operated in 1880 the patient had survived twenty-one months and had then died of phthisis, the aneurism being apparently cured. The idea propounded by Macewen was not an entirely new one. The introduction of eight or ten needles with their points crossed, thus favoring the formation of clot, had already been reported with good results.

Dr. T. M. Markoe thought that one of the chief dangers of operative interference in these aneurism cases was from hæmorrhage through the collateral circulation, and anything which effectually guarded against this occurrence was a long stride in the treatment of these conditions. He advocated, as one of the best methods of securing freedom from these hæmorrhages, the ligaturing of the vertebral arteries.

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DR. BRYANT, in closing the discussion, said he was aware that the tying of the vertebrals was not attended with any very great danger, except in aged persons or where there existed structural changes in the vessels. It was, however, a question whether the posterior communicating arteries were at all times of ample capacity to carry on proper collateral circulation following tying of the vertebrals. He had seen frequent instances in the dissecting room in which these communicating vessels had but little if any connection with the vertebrals. In such instances as these he believed the dangers of cerebral softening to be far greater with ligature of the vertebrals than in those having well-pronounced posterior communicating branches.

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Stated Meeting, March 5th, 1891.

A NEW METHOD FOR DIRECT ELECTRIZATION OF THE STOMACH.

By MAX EINHORN, M.D.,

PHYSICIAN TO THE GERMAN DISPENSARY, AND INSTRUCTOR IN CLINICAL MEDICINE AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL.

MR. PRESIDENT AND GENTLEMEN:—Numerous experiments have been made in the study of the influence of electricity upon the stomach and intestines; all of them serve to demonstrate the physiological effects of this agent.

Ludwig and Weber,* Von Ziemssen,† and Bocci‡ have stated that on animals the faradic as well as the galvanic current, applied directly to the stomach, causes contractions of this organ and produces secretion of the gastric juice.

Shillbach,§ upon applying the galvanic current to the bowels of a rabbit, observed intense contractions at the site of the anode, followed by peristaltic movements. Fubini ‖ lately demonstrated, after making a Vella's double intestinal fistula, that electricity quickens intestinal peristalsis to a high degree, viz., about five or six times.

The influence of electricity upon the stomach and intestines thus being evident, it is perfectly right to endea-

* Ludwig and Weber: cited from Kussmaul, Arch. für Psych. und Nerv., 1877, Bd. viii., p. 205.

† Von Ziemssen: Klin. Vorträge, No. 12, "Die Electricität in der Medicin."

‡ Bocci: Lo Speriméntale, June, 1881.

§ Schillbach: Virch. Arch., Bd. cix., p. 284.

‖ Fubini: Centralbl. für die med. Wissensch., 1882, No. 33, p. 579.

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vor to make use of this means in the therapeutics of these organs.

For many years past numerous authors have employed electricity in affections of the stomach and intestines. The method generally used for this purpose consisted in the percutaneous application of the current; usually one electrode was held in the neighborhood of the vertebral column at about the sixth dorsal vertebra on the left side, the second electrode being placed at the epigastrium.

A. D. Rockwell and M. Beard * were among the first to make use of electricity on a large scale in the treatment of nervous dyspepsias. To the application of electricity to the stomach they added general electrization and had the most brilliant results.

Neftel,† in 1876, says: "For more than eight years I used the induced current in the treatment of dilatations of the stomach arising from chronic catarrh, with much success."

Fürstner ‡ has treated three cases of suddenly appearing attacks of gastric tympanites in nervous females with the galvanic current, and could always observe an amelioration of the complaints. Each time after the galvanization Fürstner found the limits of the stomach diminished. Based upon this fact he recommends the same method of treatment in atonic dilatations of the stomach.

Oka and Harada§ treated thirteen stomach patients with the faradic current, with the result that five were cured, six improved, and two uninfluenced. Leube, ‖ in the treatment of nervous dyspepsia, recommends the daily application of electricity. Lente ¶ and Semmola** have

* A. D. Rockwell and M. Beard: Philad. Med. Surg. Reporter, 1868, No. 20, and 1871, p. 470.

† Neftel: Centralbl. für die med. Wissensch., 1876, No. 21, p. 370.

‡ Fürstner: Berl. klin. Wochensch., 1876, No. 11.

§ Oka and Harada: Berl. klin. Wochensch., 1876, No. 44.

‖ Leube: Deutsch. Arch. für klin. Medicin, 1879, Bd. xxiii., p. 98.

¶ Lente: Arch. of Electrol. and Neurol., 1874, i., p. 193.

** Semmola: L'elettricità nel vomito, Gaz. med. Ital. Lombard., 1878, No. 6.

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obtained splendid results by the use of electricity in cases of vomiting of the most various nature. Lente recommends electricity as a cure for sea-sickness, though he has not given the matter a sufficient trial. Richter * advises the use of electricity in nervous dyspepsia and nervous enteropathy. Leubuscher † speaks highly of the application of the galvanic current in pathological conditions of the lower intestines.

Besides these clinical facts, there have lately been added some more exact notes as regards the physiological effects of percutaneous electricity of the stomach in man. Ewald and myself ‡ have been able to demonstrate an acceleration of the motor faculty of the stomach under the influence of percutaneous faradization, by the appearance of the salol test in the urine about one-fourth of an hour earlier than otherwise. A. Hoffmann § showed that the galvanic current percutaneously applied in the gastric region for twenty minutes produces an abundant secretion of gastric juice.

Although the favorable influence of electricity, even percutaneously applied, is quite evident in numerous affections of the stomach and intestines, it, however, remains questionable whether any of the produced electricity penetrates to the stomach. The main currents undoubtedly go through the skin and muscles, and if any of them reach the stomach they must be very weak. But surely we might expect to attain better and more successful results by the application of electricity directly to the stomach. In his celebrated book on "Electrotherapy," Erb ‖ says: "The first maxim to observe is the treatment in *loco morbi, i.e.*, the application of electricity to the morbid part itself. . . . There is no doubt that it is best,

* Richter: Berl. klin. Wochensch., 1882, Nos. 13 and 14.

† Leubuscher: Centralbl. für klin. Med., 1887, No. 25.

‡ Ewald and Einhorn: Verhandlungen des Vereins für innere Medicin, 1888, p. 58.

§ A. Hoffmann: Berl. klin. Wochensch., 1889, Nos. 12 and 13.

‖ Erb: "Handbuch der Electrotherapie," p. 279.

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in the great majority of cases, to operate directly on the diseased spot."

Pepper* had a patient with dilatation of the stomach, in whom the abdominal walls were so thin that the spontaneous peristalsis of the stomach could be perceived. On this patient he showed that electricity, percutaneously applied, never produced any peristaltic movements of the stomach. Pepper then continues as follows: "The difficulty of compelling a current, no matter what may be its strength, to penetrate through various layers of tissue of different consistence and anatomical character, is well known." Speaking of the percutaneous electricity of the stomach, Kussmaul † remarks: "The therapeutic results obtained by Fürstner and others in cases with dilatations of the stomach do not prove that by means of the current a direct peristalsis of the stomach was induced, but could be attributed to the favorable influence of the contractions of the abdominal walls." All the sentences mentioned plead for applying electricity to the stomach directly, and not percutaneously, if possible.

Canstatt ‡ first proposed to combat dilatations of the stomach by direct electrization, introducing one electrode into the œsophagus and putting the other in the stomach region. Duchenne § was the first who made use of this method. Very soon afterward, in 1877, Kussmaul ‖ began to practise the direct electrization of the stomach. The electrode used for the purpose consisted of a stomach tube, through which ran a copper wire ending in an olive point and fastened to the cut-off end of the tube. In several patients with dilatation of the stomach Kussmaul introduced this electrode into the stomach, the other (ordinary) electrode being held in the hand. In applying electricity in this way contractions of the abdominal

* Pepper: Philad. Med. Times, May, 1871, p. 274.

† Kussmaul: Arch. für Psych. und Nerv., 1877, viii., p. 205.

‡ Canstatt: cited from Kussmaul, l. c.

§ Duchenne: cited from Kussmaul, l. c.

‖ Kussmaul: l. c.

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muscles on the left side appeared, and in one patient with thin abdominal walls contractions of the stomach were visible on applying weaker electric currents. Kussmaul speaks very highly of this method for the direct electrization of the stomach.

Later on Balduino Bocci,* in 1881, experimenting on animals, was persuaded "that the indirect faradization of the stomach through the abdominal walls produces in the stomach, even when applied in a very energetic way, phenomena of very little importance and of a dubious curative effect." As the direct faradization of the stomach, on the other hand, showed all the above-mentioned physiological effects, Bocci recommended anew the use of the direct electrization of the stomach for therapeutic purposes. Bocci used for this end an electrode like that of Kussmaul.

Great progress in the direct electrization of the stomach was made in 1884 by G. Bardet.† The direct contact of the lower metal piece of the electrode with the inner wall of the stomach irritates only a small spot, and this very intensely, whereas the larger part of the stomach receives but very little of the electricity produced; in consequence thereof the galvanic current could not be applied, because by the usual method it would not be possible to avoid lesions of the mucous membrane of the stomach. In order to overcome these drawbacks Bardet constructed his stomach electrode in such a way that the metal piece running through the tube was shorter than the tube and did not touch its windows. By filling the stomach with water the electric circuit between the stomach wall and the lower metal piece of the electrode was established. In this way the electricity was distributed over the whole surface touched by the water. By means of this electrode Bardet treated three cases of dilatation of the stomach, and one case of obstinate vomiting, with

* Bocci: Lo Sperimentale, June, 1881.

† Bardet: Bull. Gén. de Thérap., 1884, tome cvi., p. 529.

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the galvanic current (15 to 25 milliampères) and obtained splendid results. Most authors who employed the direct electrization of the stomach have, until now, generally used Bardet's electrode. (Charles G. Stockton's* stomach electrode does not differ very much from that of Bardet.)

Although the high value of the direct electrization of the stomach is self-evident, this method did not enter much into practice, because the tube surrounding the electrode had to be kept in the throat during the whole electric session (about ten minutes), and inconvenienced the patient to such a degree that the procedure could be carried out only in people accustomed to lavage of the stomach, and even by them it was disagreeably felt. That is the reason why Von Ziemssen† rejected direct electrization of the stomach as being too straining and exhausting. Ewald,‡ notwithstanding these difficulties, recommends it. In the same way Charles G. Stockton,§ in his elaborate paper entitled "Clinical Results of Gastric Faradization," highly recommends the use of direct electricity in cases of dilatations of the stomach and in many functional disturbances of this organ. Boas,‖ on the other hand, is conservative as regards the use of direct electricity for the stomach. This author gives in his book, "Diagnosis und Therapie der Magenkrankheiten," a drawing of the stomach electrode generally in use, which consists, as described above, of a stomach tube, through which runs a fine spiral wire ending in a metallic button within the tube.

In order to facilitate the internal or direct electrization of the stomach, I have constructed an electrode on the

* Charles G. Stockton: "A New Gastric Electrode," Medical Record, November 9th, 1889, p. 530.

† Von Ziemssen: "Ueber die physikalische Behandlung chronischer Magen- und Darmkrankheiten," p. 10. Leipzig, 1888.

‡ Ewald: Klinik der Verdauungskrankheiten, p. 64. Berlin, 1889.

§ Charles G. Stockton: The American Journal of the Medical Sciences, July, 1890, p. 20.

‖ Boas: Allgemeine Diagnostik und Therapie der Magenkrankheiten, p. 239. Leipzig, 1890.

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same principle as the stomach bucket designed by me.* This electrode once swallowed reaches the stomach without further artificial aid. The silk thread of the bucket is represented in the electrode by a very fine (one millimetre in diameter) rubber tube, through which a very fine, soft conducting wire runs to the battery. The end piece of the electrode consists of a hard rubber capsule (of the same size and shape as the stomach bucket) with many openings. In this capsule lies a metallic button which is connected with the wire.

The rubber capsule serves to avoid the direct contact of the metal with the stomach wall; the circuit is completed in the same way as in Bardet's electrode, by the water the stomach contains.

This electrode might be aptly designated a "Deglutable Stomach Electrode." †

Method: The patient drinks, best when in a fasting condition, one or two glasses of water (tea, coffee, or beer). The patient has now to open his mouth widely, and the electrode (the capsule piece) is placed far behind on the root of the tongue, and he is ordered to swallow. He again drinks some water, and the electrode finds its way to the stomach without any further assistance.

In order to recognize this point precisely, it is advisable to make some mark on the cord at a distance of forty centimetres from the capsule; as soon as this mark comes to the teeth we are sure that the electrode is in the stomach, and we can apply the electricity to the patient.

The other (ordinary) electrode is best placed either on the back to the left of the seventh dorsal vertebra, or in front of the epigastric region, or is simply held in the hand. In cases where the stomach and intestines have to be electrized, it is advisable to use as second electrode a very broad one (the so-called "plate electrode"), and to keep it on the abdomen.

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* M. Einhorn: Medical Record, July 19th, 1890.

† The Deglutable Stomach Electrode is manufactured by John Reynders & Co., 303 Fourth avenue, New York.

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In withdrawing the electrode, a resistance is felt at the introitus œsophagi; it is not advisable to pull the electrode with force. One has only to make the patient swallow once or twice, and to make use of the moment when the larynx, by this act, ascends and the passage becomes free, to withdraw the electrode, which is done now with perfect ease.

Direct electrization of the stomach by means of the deglutable electrode is very simple and handy for the patient and for the physician, and, as it seems to me, as easy to apply as percutaneous electrization. Considering the great rôle electricity plays in medicine as a therapeutic means, it has been, perhaps, to a certain degree neglected in the treatment of stomach and intestinal disorders, because a handy method for the direct electrization of the stomach was wanting.

I hope after a while to be able to give a detailed account of the physiological effects of direct electrization of the stomach in man. To-night I would like to describe a few experiments which tend to prove that the gastric-juice secretion is increased by direct electrization of the stomach.*

The investigations have been made in the following way: Three persons not having any complaints in reference to their digestion were examined, when fasting, with the tube, in order to see whether the stomach was empty or not; and if not, then it was emptied. Thereupon each one of them drank 100 or 160 c.c. of water and swallowed the stomach electrode—electricity, however, not being applied. After ten minutes the electrode was withdrawn and the stomach contents emptied by means of a tube, and examined in regard to hydrochloric acid and to the degree of acidity. Thereupon the same trial subjects had to drink again the same quantity of water, and the stomach

* Remark: As regards the physiological action of direct electrization of the stomach in man, there have been as yet, so far as I could see from the literature, no investigations made.

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was now faradized (the deglutable electrode being in the stomach, the other in the left hand), not very strong, for ten minutes; then the contents were obtained, examined, and compared with the first portions.

The trials were as follows:

I.—T. N——, physician, twenty-eight years of age; September 10th, 1890; when fasting; stomach empty.

1. Drinks 100 c.c. of water and swallows the electrode. After ten minutes the electrode is withdrawn, and about 50 c.c. of the stomach contents are obtained. Reaction = acid; HCl + weak; acidity = 12.

2. Drinks 100 c.c. of water, swallows the electrode, and gets faradized for ten minutes. The electrode is thereupon withdrawn and 40 c.c. are obtained by means of a tube. Reaction = acid; HCl + ; acidity = 16.

II.—T. S——, fifty years of age; September 23d, 1890; when fasting; stomach contains about 5 c.c. of mucous secretion with presence of HCl.

1. Drinks 160 c.c. of water and swallows the electrode. Ten minutes later the electrode is withdrawn and 140 c.c. obtained. Reaction = weakly acid; HCl with Congo = no reaction, with Günzburg's test = ?; acidity = 4.

2. Drinks 160 c.c. of water and is faradized. After the swallowing of the electrode for ten minutes the obtained quantity = 170 c.c. Reaction = acid; HCl, Congo paper turns blue on the margin, Günzburg's test = + (even when twice diluted); acidity = 8.

III.—H. R——, twenty-two years of age; September 24th, 1890; when fasting. There were obtained 3 to 5 c.c. of stomach secretion, with HCl = 0.

1. Drinks 100 c.c. of water, and swallows the electrode. Ten minutes later there were obtained by the tube 80 c.c. HCl + ; acidity = 8.

2. Drinks 100 c.c. of water and is faradized. After swallowing the electrode for ten minutes the obtained quantity = 100 c.c. Reaction = acid; HCl + ; acidity = 12.

In all three experiments we find a higher degree of acidity in the second part of each trial, when faradization was applied, than in the first part, during which everything had been done just in the same way minus electricity. The conclusion that the faradic current increases the

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production of the gastric juice, therefore, seems to be justifiable.

As to the clinical cases treated after this method of direct electrization of the stomach, I would not like to trouble you at present with detailed accounts. However, I cannot abstain from giving you in a few words a *résumé* of my clinical experiences since September last.

The direct faradization of the stomach has been applied in:

(*a*) Three cases of hyperacidity; (*b*) five cases of dilatation of the stomach (caused by insufficiency of the motor power); (*c*) five cases of chronic gastric catarrh (or, more correctly, of gastritis chron. gland.) with diminished acidity; (*d*) one case of atrophy of the mucous membrane of the stomach.

The galvanic current has been applied internally in two cases of very severe gastralgia.

The most marked results have been obtained in all cases of dilatation, and in the grave cases of chronic gastric catarrh. The ameliorated condition was not only a subjective one, but could often be proven also objectively by the change in the chemical analysis of the stomach contents. In two cases of very aggravated chronic gastric catarrh, in which free hydrochloric acid could never be found after the test meals, the same could easily be detected after the stomach had been faradized internally for ten minutes.

The majority of cases of hyperacidity (not combined with dilatation) likewise showed an improved condition. Here, by electricity alone, I seldom succeeded in diminishing the abnormally high degree of acidity. In order to fulfil this purpose I had to give the alkalies in the usual way.

The two cases of pure gastralgia showed an amelioration from the constant current, *i.e.*, first a decrease and then a disappearance of the attacks of pain, after the current had been applied for about two or three weeks, although it is certainly impossible to say for how long after such an electric cure the gastralgia will not reappear.

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From the above it is evident that we possess in the direct electrization of the stomach a very potent means of overcoming certain abnormal conditions, and thereby permitting the functions of the stomach to adjust themselves to the normal. Let me therefore hope that this easy way of applying electricity directly to the stomach by means of the deglutable electrode will tend to bring this remedy more into use among the medical profession.

SO-CALLED LACERATION OF THE PERINEUM.

By HENRY J. GARRIGUES, A.M., M.D.,

PROFESSOR OF OBSTETRICS IN THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; CONSULTING OBSTETRICIAN TO THE NEW YORK INFANT ASYLUM; VISITING OBSTETRIC SURGEON TO THE NEW YORK MATERNITY HOSPITAL; GYNÆCOLOGIST TO ST. MARK'S HOSPITAL, ETC.

On account of its hidden position between the buttocks, the perineum is little exposed to injury from without. Still, under particular circumstances, wounds of this kind are incurred. Thus, punctured, incised, torn, or contused wounds, which may be extensive enough to cause a complete laceration of the partition between the genitals and the rectum, are occasionally produced by falling down on the upright of a chair, the slat of a fence, or a pitchfork concealed in a haystack, or by sliding down the balusters of a staircase against the boss of the newel post. Similar lesions are sometimes caused by the goring horn of an infuriated bull, or by rape, especially when there is a marked disproportion between the organs that come in contact.

Of much more frequent occurrence are injuries due to a force coming from within. An acute prolapse of the uterus or the expulsion of a large fibrous polypus may cause such lacerations; but by far the most common

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cause is childbirth, and that is the kind of laceration to which I shall confine myself in this paper.

In most text books upon obstetrics and gynæcology we find descriptions of laceration of the perineum which give an entirely erroneous idea of the lesion sustained, and are unfit to form the basis of an intelligent conception of the pathological conditions caused by it, and the proper therapeutic measures to be adopted in different cases.

The common way of dividing perineal lacerations takes only the extension of the tear into consideration. Thus, authors distinguish three, four, or five degrees of laceration, according to the extension of the tear—through the fourchette alone, to a point between the vulva and the sphincter ani muscle, to the external circumference of the sphincter, to some point in the expansion of the sphincter, through the whole thickness of the muscle, and more or less up the recto-vaginal septum.* In my opinion this doctrine overlooks the most important point.

While it is unnecessary thus to divide a tear between the vulva and the rectum into half a dozen varieties, this elaborate division does not comprise some of the most important lesions of the genital outlet resulting from childbirth. It is due to the deplorable confusion between the entrance of the vulva, *rima pudendi*, and that of the vagina, *introitus vaginæ*, to which I have already called attention in my paper on "The Obstetric Treatment of the Perineum," published in the *American Journal of Obstetrics* in 1880.

The old authors used the expressions *vulva*, *matrix*, and *uterus* to designate the whole genital canal from the rima pudendi to the fundus uteri, just as the public yet nowadays frequently uses the word womb in this sense. Modern medical authors would never confound the uterus and the vagina, but it is by no means rare, or, rather, it is quite common yet, to confound the vulva and the

*A. Charpentier: "Traité pratique des Accouchements," Paris, 1883, tome ii., p. 223.

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vagina, and to speak of the vaginal canal in such a loose way that it gives rise to considerable confusion. Still, the two latter organs are divided by just as distinct a line of demarcation as the two former, the limit between the vulva and the vagina being the hymen or its remnants, just as the vaginal portion with the os forms the limit between the vagina and the uterus. The rima pudendi is a slit in the skin, running in a straight line in an antero-posterior direction from the mons veneris to the fourchette; the entrance to the vagina lies an inch or two deeper, is circular, surrounded by mucous membrane and muscles, and is the seat of the hymen or its remnants. These two openings form two comparatively narrow rings at and near the outlet of the parturient canal, and the upper one is, again, the narrower of the two. These rings are, therefore, the two places where laceration commonly begins during childbirth, and from which it may extend more or less into the neighboring tissues. The upper ring, being the narrower of the two, is also more frequently torn.

These two rings differ much from one another in their component parts. The outer or vulvar ring consists of skin, a thin expansion of unstriped muscular fibres called *woman's dartos*, adipose, and connective tissue.

The inner or vaginal ring is covered with mucous membrane, and under that lies a collection of muscles and fasciæ which gives it greater solidity, allows a considerable dilatation, especially after the softening and new growth of loose connective tissue that takes place during gestation, but which, if the tension becomes too great, may give way. These muscles deserve particular attention, since it is injury to them that constitutes the true cause of the sufferings usually attributed to laceration of the perineum. They form three layers. The superficial layer consists of the bulbo-cavernosus or sphincter vaginæ muscle, the superficial transversus perinæi muscle, and unstriped muscle fibres uniting the two posterior ends of the bulbo-cavernosus muscle. The middle layer is repre-

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sented by the transversus perinæi profundus muscle and the constrictor vaginæ. The deepest layer is formed by the levator ani muscle.

The *bulbo-cavernosus* muscle receives some fibres from the external sphincter ani, the levator ani, and the superficial transversus perinæi muscles, and others originate from the ischio-perineal ligament and the neighboring tendinous tissue. It is inserted on and near the clitoris. It lies outside of the vulvo-vaginal gland and the vestibulo-vaginal bulb, which it compresses, and is not a very powerful muscle. It surrounds the vaginal ring on the sides, but does not close it in front nor behind, and the name sphincter vaginæ is therefore less appropriate.

The *transversus perinæi superficialis* muscle closes the vaginal ring behind. It is a pair of still weaker muscles, but, going from the inside of the tuberosity of the ischium to the transverse septum of the perineum, bisecting the angle between the bulbo-cavernosus and the sphincter ani externus, intermingling with both, it steadies the perineal body and helps during parturition in pushing the presenting part of the child forward toward the pubic arch. In many women this muscle takes a more forward course, so that it does not reach the perineal body at all, but is fastened to the outer edge of the bulbo-cavernosus muscle. With such an insertion its function can only be to open the vaginal entrance. The superficial layer of muscles is situated between the superficial perineal fascia and the anterior layer of the deep perineal fascia.

The muscles of the deeper layer are little developed, not clearly separated from one another, and differently described by different anatomists. They are situated between the two layers of the deep perineal fascia.

The *deep transversus perinæi muscle* arises from the ramus of the ischium and goes horizontally to the side of the vagina, which it helps to steady.

The *constrictor vaginæ muscle* consists of a few fibres which arise from the transverse septum of the perineum and encircle the vaginal entrance as a sphincter.

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Thus the deep transversus and the constrictor vaginæ correspond to the superficial transversus and the bulbo-cavernosus of the superficial layer.

Of all the muscles contributing to the formation of the vaginal ring, the *levator ani* is by far the strongest and most important. It forms a horseshoe-shaped muscular expansion, which is open in front, is attached in a wide circumference to the walls of the pelvis, and forms a double loop behind the vagina and the rectum. It is generally described as two muscles—the levator ani proper and the coccygeus—but they touch one another with their edges, so that one is a continuation of the other, and they often even coalesce. Under all circumstances they form together a pelvic diaphragm corresponding to that which limits the abdominal cavity above. The levator ani takes its origin from an oblique line on the posterior surface of the body of the pubic bone, from a small circle just in front of the spine of the ischium, and from the tendinous arch, part of the pelvic fascia, extending between these two bony attachments, the pubic portion goes backward and inward, crosses the vagina, to the sides of which it is bound by strong connective-tissue attachments. Its fibres are interwoven with the longitudinal fibres on the lateral aspects of the vagina. Some loops go from side to side between the vagina and the rectum, but the greater part of the muscle goes behind the latter, forming loops without any intermediate tendon. They hug the concavity of the end curve of the rectum and support it from below. The levator goes in between the external and the internal sphincter and intermingles with both of them, as well as with the longitudinal fibres of the rectum.

This muscular expansion is covered above and below with a fascia: above it is the vesico-rectal part of the pelvic fascia; and below it is the anal fascia, part of the deep perineal fascia.

Besides other functions that do not concern us here, it draws the anus forward in the direction of the symphysis, pulls the vagina forward during childbirth, and

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pushes the child forward so as to make it turn the pubic arch.

Between the vulvar and vaginal rings behind is the *fossa navicularis*, and between both rings and the rectum is the *perineal body*. After having been entirely neglected until it was described by Henle and Savage, this structure acquired all of a sudden an enormous importance and was made the "keystone" that supported all the pelvic organs. A great deal has been written about it, and different authors have assigned a very different shape to it, but the study of sagittal sections of the pelvis shows that it has a great variety of shapes. Sometimes the whole space between the rectum and the vagina, up to the cervix uteri, forms one triangular surface. In other cases this space is easily distinguishable as an upper narrow and a lower broad part, the latter alone deserving the name of perineal body; but this body appears again with very different forms and differs in extension upward. It may just form a slight swelling, so that the whole sagittal cut becomes nearly club-shaped. Sometimes the whole body lies below the hymen, while in other cases it extends more or less up behind the vagina. The shape is sometimes nearly quadrangular, with one side turned to the skin, one to the rectum, one to the vulva, and one to the vagina. In others it has the shape of the quadrant of a circle; in others again that of the receiver of a retort, the neck of which is formed by the narrow part between the vagina and the rectum. This great diversity of forms is easily understood when we take into consideration the fact that all the parts concerned are made of more or less soft tissue.

The perineal body is composed of the posterior ends of the bulbo-cavernosi muscles, unstriped muscle fibres uniting them behind, fibres belonging to the superficial transversus perinæi muscle, the external and internal sphincteres ani and the levator ani muscles, the ischio-perineal ligament, the posterior part of the superficial and deep perineal fasciæ, the anal fascia, and adipose tissue. It is covered below by the skin lying between the anus and the

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rima pudendi, behind by the rectal mucous membrane, above and in front by the mucous membrane of the vulva and sometimes of the vagina. It has no definite lateral limits, unless we artificially suppose it to be continued to the tuberosity of the ischium. The cutaneous surface is shorter than in man, measuring only one-half to one inch in length, while the distance from the anus to the entrance of the vagina, the true length of the perineal body, is about one and three-fourths inches. According to what has just been said about its upper limit, no definite height can be ascribed to it.

Small as this body is, it is of great importance in forming the centre of the whole perineal region, where muscles, fasciæ, and ligaments come together. As they are fastened to the surrounding bones, the perineal body becomes the chief support of the pelvic floor. It keeps the vagina and the rectum in their proper relative position. During childbirth it forms a strong barrier against which the child is being pushed from above and pressed forward around the pubic arch by passive and active counter-pressure. During this act its power of resistance is often overcome, and a laceration takes place.

Besides the two rings we have called attention to at the outlet of the genital canal, a third ring, formed by the internal and external sphincteres ani muscles, must be considered. Its function is to close the intestinal canal. Examined from the vagina, the anus forms a weak point in the pelvic floor. During childbirth it is pushed and drawn forward, and becomes enormously distended, as does all the surrounding tissue between the coccyx and the vulva.

When the child is pushed against the vaginal ring it may break through to the rectal ring and be born through the rectum. The rectal ring may either burst or withstand the great tension, and the vulvar ring remain intact. The child may also be born between the rectal and vulvar rings, so that both remain intact, while the vaginal ring above is broken—so-called central perineal rupture.

A modification of this is the condition where first a cen-

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tral rupture forms and then extends into the vulvar ring. Another modification is that in which the central laceration stays incomplete—that is to say, no perforation takes place in the perineum, part of the tissue between the skin and the vagina remaining entire.

While the lesions so far mentioned are rarities, we come now to the most common of all, namely, those cases in which the vaginal ring alone is affected. These tears may be superficial or deep, open or concealed, longitudinal or transverse.

According to Duncan* every primipara sustains a laceration of the posterior part of this opening, but my own observations have taught me that this is a mistake. I have notes of cases in which there were tears of the labia, the fossa navicularis, the fourchette, and even the vagina, without any injury to the vaginal entrance. Tears here are, however, common, and may extend more or less upward into the vagina and more or less downward into the fossa navicularis. If they are superficial and only go through the mucous membrane they are of little importance, the severed parts being kept in contact by the deeper, and healing easily.

The deep tear of the vaginal entrance, implicating the levator ani muscle, is usually found backward and outward in the direction of the tuberosity of the ischium, the reason for which is probably that the muscle is caught between this point and the head, while in the median line the intervening rectum, and the double fascia that descends in front of it as a continuation of the pelvic fascia, furnish a soft pad which protects the muscle.

Sometimes the muscle snaps in the depth of the tissues, while the mucous membrane, containing more elastic fibres, resists the strain, so that the result is a submucous tear, just as the biceps during a sudden flexion of the arm may burst under the skin. As in rupture of the biceps we can put our fingers in between the two retracted ends

* Matthews Duncan: "Papers on the Female Perineum," London, 1879, p. 8.

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of the muscle, so in the rupture of the levator ani we can put one finger into the gap, only with this difference, that the rupture does not extend through the whole width of the muscle. At, and to some variable extent above, the vaginal entrance, we feel a V-shaped break in the ring.

The power working eccentrically, the rupture in the vast majority of cases takes place in a radius; in other words, the ring is broken, and the lesion is a longitudinal rent in the genital canal. Exceptionally the direction of the rent may be more or less transverse. The most common rent of this last kind is a tear along the base of the insertion of the hymen, whereby this membrane is torn more or less completely loose from its connections. Drs. T. A. Emmet* and Matthews Duncan† describe also other transverse tears, and the former thinks that this form of lesion is the common one. Admitting the possibility of such a tear by which the whole vaginal ring is sundered from the upper part of the vagina, or a partial tear produced by a transverse fold being caught by the advancing child and torn loose from side to side, in my opinion this is and must be a comparatively rare lesion. When the distinguished American author thinks that it is the common form of injury in childbirth, I am inclined to account for it by the fact that, at the time he turned his observation to the tears of the vaginal outlet, he had long ago given up obstetric practice. Because we find transverse cicatrices in gynæcological patients, we cannot conclude that the fresh tear had the same direction. When a longitudinal rent does not heal by juxtaposition of the torn surfaces, it changes direction and leaves a transverse line of cicatrization. This, I believe, is the explanation of the two facts with which everybody who is engaged both in obstetrical and gynæcological practice will be familiar—namely, that fresh rents, examined immediately after delivery, nearly always follow the direction of the axis of the parturient canal; and, on the other hand, that

* T. A. Emmet: Trans. Amer. Gyn. Soc., 1885, vol. x., p. 161.

† M. Duncan: loc. cit., p. 24.

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transverse cicatrices are exceedingly common in women who seek relief for diseases of the genitals.

A tear involving the levator ani at the vaginal entrance deprives the pelvic structures above of their necessary support. As soon as the patient gets up she has a disagreeable feeling of looseness and bearing-down. In the course of time the vaginal mucous membrane bulges out in front and behind, the bladder sinks down, the uterus is first retroverted, then retroflexed, then it descends, and may finally hang between the legs. The strain on the utero-sacral ligaments, the broad ligaments, and the connective tissue of the pelvis causes pain in the sides of the pelvis, and backache. It interferes with free circulation in the pelvis, causes a sensation of heaviness, and produces hyperplasia of the uterus. The vagina is inverted and becomes unfit for one of its purposes. The cervix is drawn out to a great length, its lips everted, and, in consequence of friction against the clothes, a large ulceration forms around what seems to be the os, but in reality is a point situated much higher up in the canal.

The prolapse of the anterior wall of the vagina is commonly called cystocele—a correct name, since the bladder always forms part of the swelling. The prolapse of the posterior wall is commonly called rectocele, which is not correct. The rectum nearly always stays in its normal place, and the vagina slides away from it. It is easy to satisfy one's self on this point by seizing the prolapse between the index finger and the thumb. If it contained the rectum, two slips would be felt when the seized tissues slip out between the fingers: one representing the rectal wall, and the other the vaginal wall; but we feel only the latter. The reason of this difference is that the bladder is bound to the upper part of the vagina and the cervix with short, tight connective tissue, while that connecting the posterior wall with the rectum is much looser.

It is possible that the anal ring alone may be broken. Dr. T. A. Emmet* has reported a case of this kind in

* Transactions American Gynæcological Society, 1883, vol. viii., p. 202.

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which the rupture had taken place behind, leaving the vulvar ring uninjured, and, since nothing is said about the vaginal entrance, it is probable that that also had escaped.

The vulvar ring may be broken, and that is the lesion that has been earliest recognized, and which yet forms the base of most descriptions of lacerations of the perineum. The many classes into which this tear has been subdivided are superfluous. The only question of importance is whether the vulvar ring alone is implicated, or the tear extends through the anal ring—so-called incomplete and complete laceration of the perineum.

The injury commonly takes place in the median line, beginning at the posterior commissure and extending more or less backward. But if the perineum escapes, or only suffers little, especially if the accoucheur helps to press the head forward against the symphysis, the injury to the distended vulva often takes the shape of superficial tears on the labia majora, or deeper tears in the labia minora and the vestibule, near the clitoris.

Nearly all these tears have a longitudinal direction, more or less parallel to the axis of the parturient canal, or at right angles to the rima pudendi; but if the severed halves of the perineum do not unite by first intention, they heal separately, each forming one-half the cicatrix, in which way cicatrices with a transverse direction are formed. By involution taking place in the vulva after the enormous distention during childbirth, the direction of the cicatrices is also changed. I have seen real transverse tears by which a strip of mucous membrane, extending from one side to the other of the rima pudendi, is torn loose from the fossa navicularis, and tears of the labia majora parallel to the rima pudendi, but such lesions are exceedingly rare compared with longitudinal tears.

The consequences of tears limited to the vulvar ring are slight or none. Most women are little concerned about an affection which does not cause them any discomfort, but the male may find less satisfaction in sexual intercourse

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on account of the enlargement of the vulva, and sometimes there is a tenderness of the scar which causes the woman pain.

In a complete superficial tear both the vulvar and the anal rings are broken and form a single instead of a double ring; the sphincter retracts, its ends being plainly marked by a little glazed pit on either side; where the perineal body should be, a V-shaped cleft is seen; the mucous membrane of the rectum rolls out, forming a little, red, soft, puckered cushion at the posterior circumference of the anal opening; and the patient has no control over flatus and fæces, which escape involuntarily and make the poor woman an object of disgust to herself and others. But if the vaginal ring is intact she has none of the symptoms appertaining to prolapse, which we have referred to in speaking of the rupture of that aperture.

I recently operated on an elderly lady who had had for twenty years a tear through the perineal body, extending one inch and a quarter up the rectum, but where the vaginal ring had not suffered at all. The sphincter ani could be felt as a thick, resistant ring without a break, and there was neither cystocele, rectocele, nor the slightest descent of the uterus, nor any symptom of pelvic trouble whatever.

Just as the tear in the vulvar ring may be combined with that of the anal ring, we may have a combination of the vulvar and vaginal rupture, or of all three, the result as to symptoms being a combination of those characteristic of the single tears.

In regard to treatment I shall limit myself to some general remarks.

The preventive treatment lies without the scope of this paper, and has been considered at length in my earlier paper, referred to above.

Under lucky circumstances Nature can, perhaps, effect a cure of any tear. I have myself seen this in incomplete laceration, where the whole perineal body was severed to

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the rectum; and by a cure I mean agglutination of the entire torn triangular surfaces.

During my services at the Maternity Hospital in the years 1885–86, I examined numerous primiparæ shortly after delivery, and again before they left the hospital, and took detailed notes of the tears of the parturient canal at the two periods. Thus, I satisfied myself that, with few exceptions, the tears in the fossa navicularis, on the labia, through the vaginal ring, and in the vagina healed so as to form linear cicatrices. In all the observed cases there was no, or only a very slight, tear of the cutaneous perineum, since all longer tears are immediately stitched and therefore cannot be examined, and all the patients were treated with my occlusion bandage,* which exercises a certain pressure on the external genitals.

Similar results are claimed to have been observed in cases in which the tear extended so far up the rectum that all three rings must have been broken. But as natural cures in such cases are little short of miraculous, no man in his senses would wait for them. As a rule, Nature effects only a partial healing; the parts heal, of course, in the end, but the ultimate condition is far from being identical with the pristine one. With few exceptions we do not get a healing *together*, that is, an adaptation and coalescence of the torn surfaces, but a healing *over*, that is to say, a torn surface forms an independent scar and does not grow together with the corresponding surface on the other side.

The first paper I ever heard read in this Academy was one by Noeggerath on the primary operation for lacerated perineum. Then he stood alone, every speaker either declaring that perineal laceration was so rare that he never saw it, or deprecating immediate interference. All this has entirely changed since then. We all know that, to those who look for them, perineal lacerations are very

* "Garrigues' Practical Guide in Antiseptic Midwifery," Detroit, Mich., 1886, p. 27.

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common, and the many members of the American Gynæcological Society who have written on the subject unanimously recommend the so-called primary operation, which means the insertion of sutures, so as to bring the torn surfaces together, immediately after or at least twenty-four hours after delivery. Immediately after the tear has taken place the torn surfaces fit exactly to one another, and grow much more easily together than pared surfaces. A much smaller number of sutures are, therefore, required. Secondly, if only a partial success should be obtained, the great point is gained that the parts retain their normal shape and relations, so that a secondary operation becomes easier and has greater chances of being successful.

If the vulvar ring is torn behind, alone or conjointly with the vaginal ring, perineal sutures alone, and only from one to three in number, are required. If the anal ring is broken, too, it is best to insert a triangular row of sutures, following the outlines of the triangles which immediately after childbirth represent the perineal body. If the tear extends higher up into the vagina, vaginal sutures alone are placed in the septum above the perineal body. Tears through the anal ring are united with at least two rectal sutures, so as to bring the whole breadth of the torn ends of the sphincter well together. The central perineal rupture is brought together with deep perineal sutures. If the rima pudendi and the skin perineum are intact, there is, as stated above, great prospect of the parts uniting under the comparatively aseptic condition and the pressure insured by a well-adapted perineal dressing.

Where no lesion is visible on the outer surface the friends of the patient may object to an operative interference the importance of which they do not understand. When circumstances are favorable some deep sutures may, however, be inserted from the vagina in such a way as to bring the edges of the rent in the vaginal ring together. The subcutaneous tear of the levator ani muscle might be treated in a similar way after cutting down upon it, but such an undertaking would probably

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meet with still greater opposition, not only from the public, but also from the profession. This accident is, therefore, left until bad consequences develop, and is then remedied by the secondary operation.

As I invariably stitch up tears involving the cutaneous parts of the perineum immediately, and they always grow together under my antiseptic dressing, I have little personal experience with the so-called *intermediate operation*, which consists in attempting union at any time while the torn surfaces are granulating. I have, however, notes of a case occurring in September, 1882, before the new treatment was introduced into the Maternity Hospital, in which there was a tear through the whole perineum into the rectum, with incontinence of fæces. Three silk sutures were put in at the time of delivery, but no union took place. On the thirteenth day after confinement the granulating surfaces were scraped, dusted with iodoform, and brought together with three stitches, which led to a complete restoration of the perineal body. If, therefore, the primary operation has not been performed or has failed, and the case comes under observation at the time, it is well worth while trying the intermediate operation.

If the torn parts have not been united by this or the primary operation, secondary operations are often required. There is a great variety of them, but, the time allotted to me being spent, it is impossible to enter on a criticism of their respective values. I will only state which methods I prefer, because they have given me the best results. For incomplete perineal laceration, where the vaginal ring has not sustained much injury, Tait's flap operation is sufficient, and is an easy and expeditious operation, which with proper antiseptic precautions can hardly fail. For cystocele I use Sims' or Stolz's operations; for prolapse of the posterior vaginal wall, with or without rectocele, Hegar's colpo-perineorrhaphy, with slight modifications of my own, has given me most satisfactory results; and for the complete perineal laceration the same author's modification of the operation built up by many

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predecessors, using a triangular row of sutures, has yielded excellent results at my hands.

DISCUSSION.

DR. T. A. EMMET said that apparently the author had given a great deal of study to the subject, but he must confess that from his standpoint be seemed under the influence of the older teaching, when men were misled in speaking of a perineal body. He believed that, until we dismissed the idea of a perineal body entirely, we would not be able to understand the condition of things present in lacerations at childbirth. We should simply bear in mind the presence of a diaphragm which closed the floor of the pelvis, and exclude the term perineum. The so-called perineum was simply a part and parcel of the muscular septum, with the addition of a little extra fat which lay between the rectum and vagina, and which was of little or no consequence. He would confine his remarks to the levator ani muscle, the transversus perinæi, and the fascia. First, we must consider what was a laceration of the perineum. He believed the perineum was never lacerated except the sphincter ani was torn to begin with. It was an injury to the fascia on the floor of the pelvis which allowed the muscles to separate, and with retraction of the fascia the final result was one of imperfect support of the blood vessels in the pelvis. They soon became overdistended, and consequently of increased weight, and caused great suffering in walking. We have been taught that the perineum in some way or other supported the vagina and uterus, but to his mind this view was as absurd as would be the statement that the pantaloons were held up by the instep because they rested on it. It was a mechanical absurdity. The uterus was suspended, as was every organ in the body, from above. If it had only support from below, the woman would not be able to walk at all. Five years ago or more he witnessed some sections of the pelvis at Edinburgh which clearly showed what constituted the injury, and that it was necessary to do something more for relief than simply uniting the vulva together.

The sulci of the vagina are formed of fascia continuous with the pelvic fascia above, and the traction thus exerted keeps the posterior vaginal wall in contact with the anterior one, the latter being as fixed, to all intents and

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purposes, as the roof of the mouth. Anything entering the vagina or passing out must do so by pushing back the posterior wall, as the under jaw separates for the passage of food. This fascia, which runs down alongside the vagina and in close connection with the tissues of the pelvis, is also reflected over the muscles at the vaginal outlet, binding them together in one common sheath, and is then reflected on to the neck of the bladder to bind it down under the pubis. The muscles forming the pelvic diaphragm do not cross one another, but are kept together in close contact by the fascia. In labor the head of the child comes down not unlike a piston in a cylinder, pushing the tissues of the posterior wall of the vagina in advance of the head, so that when injury does take place it is generally due to separation of the fascia on each side of the vagina where it is reflected upon the muscles in front. That part which is called the perineum served no purpose beyond that of giving proper support to the sigmoid curve of the rectum. When the fascia has been torn and has retracted, the anus becomes drawn further back toward the coccyx, the sigmoid flexure becomes exaggerated into a rectocele, and then a cystocele forms from want of support. The direct result of the injury is retraction of the fascia with engorgement of the blood vessels, as they would no longer receive the needed support from the connective tissue, and in time these vessels lose all shape and become great receptacles for stagnant blood.

He repeated that when the perineum was injured the tear began far back in the rectum, long before it reached the vaginal outlet, and extended from behind forward to the fourchette. That he was correct in his view was shown by the fact that where there was beyond question a tear in the so-called perineal body, and directly in the median line, the woman did not suffer; she could work at the washtub, and found no inconvenience except from want of control of the fæces. The blood vessels, under these circumstances, had not been injured or deprived of their natural support, as the tear had been in the median line. The worst tears were often in the deeper tissues and unaccompanied by any lesion of the mucous membrane or of the integument at the fourchette.

DR. W. M. POLK remarked that there seemed to be a greater difference of opinion regarding this little body than almost any other of equal importance, and he inferred

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from that that there was yet a great deal to be learned about it. He had constructed a theory of his own, which seemed to be the privilege of every man who had to do with this region. From a surgical standpoint he thought most theories regarding the perineal body took into consideration too many elements, which lent obscurity. He thought that if we looked upon it as a diaphragm limiting the lower part of the abdominal cavity, it would do a great deal toward simplifying the question. If we regarded it as possessing the same relations to the abdominal contents as other portions of the abdominal walls—namely, serving to maintain them in their normal relations—he thought we would have gained a better appreciation of its function and the necessity for its repair. When it gave way we had a hernia and nothing more. This should be viewed as one would view a hernia in any other part of the body. For practical purposes he thought we could ignore everything except the levator ani muscle and the fascia belonging to it. It was an important fact, as previous speakers had stated, that this muscle could be separated without any very prominent external lesion. The question of repair was simply one of restoring the structures as nearly as possible to the condition which they were in before the injury. He thought we could do no better than follow the same principles which applied to hernia in other portions of the abdomen. If the immediate operation could not be performed, he thought little of the intermediate, since retraction of the tissues took place even within forty-eight hours. In the secondary operation he followed the principles involved in Tait's operation and Marcy's method, of Boston, bringing together successive layers of torn structure as nearly as possible.

DR. W. GILL WYLIE joined Dr. Emmet in criticising the paper as seeming to take the old view when speaking of a perineal body. It seemed to him Dr. Emmet's illustration of the separation of a curtain was much more appropriate than to talk about a body in the centre, called the perineal body. He had expressed the view in a paper six years ago that the levator ani was the important part, and if an immediate operation could be performed almost any one of the usual procedures would do, but greater difficulty existed after atrophy had taken place. He thought the prolapsus of the rectum was due to pressure of fæcal matter, and with it there followed displace-

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ment of the uterus. He had described his method of operating many years ago, the important feature of which was to restore the sphincter ani and throw back the rectocele.

DR. A. F. CURRIER wished it to be borne in mind that the proposition to restore the tissues of a ruptured perineum to their normal relations, except in cases in which the operation was performed immediately after the reception of the injury, usually involved an impossibility. The injury was always followed by contraction and retraction, often by atrophy or sloughing; connective tissue had to a great degree taken the place of connective tissue. The best that even a clever anatomist could expect to do, therefore, would be to restore the contour of the vagina so that it would fulfil its function of support, even though in strength and elasticity it was inferior to the original condition.

DR. A. H. BUCKMASTER remarked that Dr. Wylie had put the cart before the horse when he stated that Dr. Emmet considered the rectocele was due to overdistention of the blood vessels. Dr. Emmet considers this condition of overdistended vessels to be due to the tearing loose of the fascial sheaths which hold the muscles of the pelvic floor in place and support the connective tissue, which in turn supports the blood vessels.

As to the tissues involved in the injury, the following experiment will help to make this matter clear. The rectum of a multiparous woman feels through the vagina not unlike a segment of thick rubber tubing. The only cause for this rigidity is the fascia which is reflected from the levator ani and slings a part of this muscle in place; and bearing this in mind, the tears can be more readily recognized. We have given up trying to obtain a firm abdominal wall by the union of the muscle after a laparotomy, because to expect muscle to sustain continuous strain is not only opposed to physiology, but because we have found practically that no muscular support is of any avail without a backing of fibrous tissue.

Having recognized the many degrees and kinds of injury, he believed the so-called Tait's operation a poor method of repair. For while it may repair an insignificant injury, it never restores a badly torn pelvic floor. He claims among its special advantages that no harm is done if it fails. The speaker had seen a woman, where the operation had failed, with two large sulci (the remains

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of the incisions) that allowed everything to fall away. The denuding operation can be repeated as well as this flap-splitting. The Tait operation crowds back a lot of tissue which atrophies. The method is a clumsy one compared to that of Emmet, which, when done intelligently, will meet every indication which arises from injury to the pelvic floor that can be met. All operations will fail to cure a very limited number of cases.

DR. GARRIGUES closed the discussion. He thought that instead of representing the old-time teaching, he represented a newer time than Dr. Emmet's. It was true Dr. Emmet had called attention to the importance of the tear at the vaginal ring, but he attributed the lesion to a tear of the fascia, and he had repeated this evening again that when the levator ani was broken it was the fascia which had torn apart. This, in the speaker's opinion, was a mistake. The fascia was a hard connective tissue, with scarcely any elastic fibres in it, and would be the last to tear apart, whereas it was an inherent quality of muscular tissue to retract when it was torn. He claimed that the tear was in the levator ani muscle, that it almost always took place in a longitudinal direction. We could not readily drop the anatomical terms perineum and perineal body. He had never said the uterus should be held in place by this body; it was well known to be held by the uterine ligaments. It was going too far to say the perineum was never torn except the levator ani were torn; for while he had placed great stress upon the importance of the latter, yet he had been able to demonstrate its entirety in one case in which the partition was torn to such an extent that a rent could be felt an inch and a quarter up the rectum. It was important to recognize the fact mentioned by Dr. Currier, that one could not unite structure to structure exactly when they had long been separated. We must bring together what we could, yet the result could not be compared to that following immediate repair.

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*Stated Meeting, March 19th, 1891.**

DISCUSSION ON MALARIA IN NEW YORK.

DR. WALTER B. JAMES opened the discussion on this subject with a paper.† It was based on a study of about four hundred cases which were supposed to be malarial, the study being in the light of recent knowledge regarding malarial diseases. According to this knowledge true malaria was due to a living animal organism, of characteristic appearance, easily distinguished from all other organisms in the human body found in the blood; in the more acute cases it was a minute amœboid body, containing pigment; in the more chronic cases it was a round, crescentic, or oblong hyaline body. He had himself studied the disease as it had been acquired in various parts of the globe, and in all the microscopic appearance of the blood was the same. At the time of the paroxysm one always found a certain number of the protozoa in a state of reproduction. These forms were not found at any other time, and it seemed very probable that the paroxysms were brought on by the ripening, as it were, of the organism.

We were yet unable to say whether there were two distinct varieties; it might be that they were only the developmental change of the same species. This supposition was entirely consistent with what was known of other similar creatures. The author believed, therefore, that we were justified in assuming that malarial disease, however acquired, was the result of a specific organism which existed in the blood, perhaps in other parts, and that a differential diagnosis could be made by examination of the blood.

An enormous amount of literature existed with regard to the soil, climate, etc., in their relation to malaria, but a careful review of it convinced the reader that this phase

* In charge of the Section on General Medicine.
† The paper has not been prepared for publication.

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of the subject was still vague and unsettled. The only way which we yet had to determine whether a given spot was malarial was to put people there and see if they got malaria. There was nothing in the geology of Manhattan Island which would enable us to say whether it would be likely or unlikely to be malarial. This question would have to be determined by clinical observation and microscopical examination of the blood. But anywhere where the disease did exist, it was more likely to occur, or to occur with greater frequency, when the soil had been freshly dug up.

Classifying the four hundred cases clinically in which he had examined the blood during the past four years, there were: 1. Cases of fever of an intermittent type. 2. Cases of fever of a remittent type. 3. Cases of disease other than malaria, but with a supposed malarial element. 4. Cases of cachexia. 5. Headaches, neuralgias, malaise, etc., of such degrees and periodicity as to suggest the possibility of malarial origin.

Regarding the first class of cases, those of intermittent fever, and in which he found the malarial organism or plasmodium, they all had a striking number of features in common, conforming much more nearly to the classical description of an attack of ague than he had expected. The great majority of them were tertian, a few quotidian, a very few double quotidian. He had not yet seen a single case of quartan intermittent fever. He was surprised to note with what uniformity enlargement of the spleen was present in these cases. He had not seen one which had lasted a week, with the plasmodium in the blood, in which he could not discover the spleen by palpation. Palpation, he said, was much more reliable than percussion in determining the size of the spleen. Ninety-eight per cent of all the cases in which the plasmodium was in the blood gave a fair history of having acquired the disease while away from New York. It must be borne in mind, however, that his cases came from that district below Seventy-second street, therefore he could not speak of the upper, newer end of the city. Cases which failed to show the organism turned out generally to be a variety of diseases other than malarial, such as sepsis, tuberculosis, typhoid and other fevers.

Only a few cases of remittent fever were seen, mostly in hospitals and having come from tropical or subtropical countries, most of them terminating fatally, showing char-

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acteristic lesions of pernicious malarial disease. In two he was able to predict a fatal issue because of the amount of plasmodium found in the blood.

Then there was a group of cases of intermittent character, called continued malarial fever, etc., considered by many of malarial nature—cases of variable duration and intensity. The spleen in these cases, according to his experience, was not regularly enlarged so that it could be felt. The fever did not reach a very high point, might or might not fall to normal some time during the day. There were headache, malaise, perspiration, usually more marked in the afternoon. The cases did not react in a striking manner to quinine. Mild indigenous cases of this kind did not show plasmodium, although it was found in a few cases which had come from abroad.

Then there was a group of diseases not malarial, but with a supposed malarial element, as typhoid fever, pneumonia, rheumatism, tuberculosis, and others, where the symptoms, being of an irregular kind, seemed to make it necessary to assume the existence of a malarial influence. In only one case of this kind, one of phthisis, had he found the plasmodium in the blood. Considering the rarity of malaria in New York, as shown by his statistics, it did not seem probable that typhoid fever, etc., should often be complicated by this affection.

In the cases of cachexia the organism found in the blood had uniformly been of the crescentic form, in a very few cases together with the amœboid. The spleen could always be made out by palpation; there was always a history of the disease having been acquired away from New York; the crescentic bodies persisted in the blood in spite of quinine. These cases resembled one another very closely, and differed from other forms of cachexia in which the organisms were not found in the blood, except in one group in children. In this exceptional group in children, the condition would be called by some marasmus, by others scrofula; but the organism was absent, although the spleen as well as the liver was enlarged.

The final class included the neuralgias, malaise, headaches, etc., of considerable periodicity, in which benefit might be obtained from quinine, but more often from Warburg's tincture. He had never found the malarial organism in the blood in these cases, except where the symptoms were distinctly of intermittent character. There were several reasons for believing them not to be cases of mal-

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aria, among them being that they existed in non-malarial as well as in malarial places, that the spleen was not regularly enlarged, that the malarial organism was absent.

All these facts pointed to the following indications: 1. That the diseases commonly called malarial in New York City might safely be divided into two groups: (*a*) malaria due to a micro-organism which caused ague wherever it existed; (*b*), the non-malarial, in the sense that they depended upon some other cause. 2. That of the malarial cases it could be said they showed more marked uniformity in symptoms in different cases than was generally believed, and that enlargement of the spleen in particular was present with greater constancy than was commonly supposed. 3. That, in the part of the city over which his observations had extended, the malarial poison was indigenous either to a very slight degree or not at all.

DR. H. M. BIGGS, being asked to speak of the pathology, said that, so far as his post-mortem experience had extended, it accorded with Dr. James' clinical experience. It had been unusual for him to find well-marked post-mortem evidence of malarial poisoning in patients belonging to New York. Some time ago he had had occasion to look over the histories of four hundred and fifty cases of malarial fever treated in Bellevue Hospital, and of this number only four had died. One of the four was a case of pernicious malarial fever from Panama. In one, death was ascribed at the autopsy to chronic alcoholism, and in one to general miliary tuberculosis; the fourth could not be traced, and no autopsy could be obtained. He believed the milder grades of malarial fever did not leave appreciable lesions post mortem; reference being made to cases in which death was due to some other cause. The cases of malarial poisoning of local origin very rarely resulted in death. As to the plasmodium, he had found nothing which resembled it in the blood of persons who had not had malaria.

DR. J. M. BYRON also spoke of the pathology, limiting his remarks to malaria as it existed in Panama and Egypt, where it was most typical. He said about the only change post mortem was enlargement of the spleen, and this might be present in other diseases. As to the plasmodium of malaria, he quoted European observers who had not found it to be constant in cases evidently malarial; and he thought entire reliance could not be placed upon it in

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diagnosis. Not meaning by this that the proper value should not be given to the plasmodium when found in the blood, but that, if absent in cases clinically presenting the symptoms of malaria, such a fact should not impair the diagnosis. Bacelli, one of the greatest clinicians of our day, who has devoted much time to the study of malaria, not only has proved that plasmodium is absent in cases of confirmed paroxysms of malaria, but also in malaria artificially produced by inoculating malarial blood into healthy subjects.

DR. A. JACOBI said it had been stated that malaria was due directly to the plasmodium in the blood, and that the severe mental symptoms were caused by its great accumulation in the small cerebral vessels, and not indirectly to a ptomaine or poison produced by it. If this were true, malaria was different from other infectious diseases, as they arose from the intermediate action of a ptomaine.

Regarding the clinical aspect of malaria in children in New York City, he said there was not much malaria in the city. There had been a good deal of it in certain localities at different times where local improvements were being made, but where drainage was established and the soil left undisturbed, or where it was disturbed only a short time, malaria did not exist to any noticeable extent. It seemed the bacteria did not penetrate soil which had not been dug up. As showing the scarcity of the disease, he said he had not seen a case of malaria the last four or five months.

But what was the cause of remittent types of fever? Might not different germs produce types of malarial fever, as they might produce types of diphtheria? For his own part, he believed that diphtheria was the result of a toxine which might be produced by the staphylococcus or the streptococcus, or by the Krebs-Löffler bacillus. Might not one form of malaria be produced by the plasmodium direct, while others resulted from a toxine? But he thought we were too much inclined to make a diagnosis of malaria when we did not know how to distinguish between disease and disease. Dr. James having shown that malaria did not exist in New York City would make physicians somewhat shaky hereafter in such a diagnosis. Catarrhal fever was often mistaken for malaria. He described it as a fever with afternoon exacerbations, lasting about a week, beginning not infrequently with a chill or two, followed by perspiration, terminating by lysis; the

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mucous membranes might be affected, manifested by cough, disturbance of digestion, diarrhœa.

DR. A. B. BALL presented some observations on the value of blood examination, and on the frequency of malaria on Manhattan Island. Examination of the blood by an expert was of invaluable assistance in making a differential diagnosis between malarial fever and a great variety of other febrile disturbances simulating it. In typhoid fever one often suspected the addition of a malarial element from the peculiar course of the disease, yet during the past three years he had found the plasmodium in the blood of but one such case, and in that one there were subsequent unmistakable evidences of malarial infection.

In so-called masked ague he thought it was doubtful how far reliance could be placed on the absence of the plasmodium, and he asked if this affection might not be secondary to, rather than the direct result of, the plasmodium—somewhat analogous to periostitis, etc., following typhoid fever, manifesting themselves after the germ had disappeared from the body. But that so-called masked ague was as common in the city as the frequent administration of quinine would indicate, he did not believe for a moment. Typical intermittent fever was very rare here.

DR. W. H. THOMSON mentioned a case of ulcerative endocarditis, one of gall stones, and one of pernicious anæmia which for a time could hardly be differentiated from malarial fever. They were only illustrative of a large class of affections with chills or rigors not malarial. He said the term malaria was inappropriate, because it meant bad air, while in fact the cause of the trouble might not be bad air but bad things—things which might produce their action by inhalation or by being taken in with the water. But we were only on the threshold of the subject, for, speaking clinically, what man present could deny that we had in New York cases characterized by chills, fever, sweating, complete remission, but differing from typical malaria in the irregularity of their course? Like malaria, they produced anæmia, headache, neuralgic affections, etc. Were we any better off in calling them catarrhal fever, as suggested by Dr. Jacobi for some cases? If catarrhal fever meant a fever which affected mucous membranes, it was very difficult to say what fever would not. Typhoid fever would be poorly distinguished if it were called a catarrhal fever,

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yet it certainly affected the mucous membrane of the intestine. We could not say that a certain class of cases, commonly spoken of as malarial, and for which malarial treatment was administered, were not really malarial simply because a specific organism had not been found connected with them. When it was shown that ague was a particular form of fever with a specific cause, a great step had been taken; but might there not be other forms of this intermittent disease connected with a different plasmodium or other germ? His conclusion was that typical ague was comparatively rare in New York, although it did sometimes occur, but that a similar disease existed here very extensively, especially where streets were turned up. He thought the term malaria should be limited to cases in which the plasmodium was present.

DR. FRANCIS DELAFIELD said he had been in the habit of dividing the cases of fever as a disease which came under his observation into four classes: 1. Patients who had distinct paroxysms of intermittent fever. These were certainly much less numerous in New York City now than they were ten or fifteen years ago, but they were still to be seen. 2. Patients who suffered from paroxysms of fever not preceded by chill, not necessarily followed by sweating, the temperature often quite high—104° F. or even 107° F.—paroxysms coming on at regular intervals, every day, second or third day, and so on. They were not uncommon. 3. Patients who suffered from a continuous fever, lasting usually about two weeks, not often less, not often much longer; the febrile movement well marked, 103° F. to 104° F. when at its height, which was usually in the afternoon; there was usually a great deal of headache, more or less perspiration. There were cases of this kind which it seemed impossible to distinguish from typhoid fever. The first two sets of cases were benefited by the same remedies which were used for ordinary intermittent paroxysms—quinine, Warburg's tincture, arsenic. But the third class never seemed benefited by such remedies; the fever seemed to run its own course and stop when it got ready. 4. The fourth set of patients were to him the most interesting of all because the most numerous. They suffered from an irregular fever, coming and going, seldom lasting an entire twenty-four hours, but lasting some hours out of each twenty-four; the temperature never very high—99.5° F. to 101° F. The patients, every week or three weeks, have fever every

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day, or every other day, or skip a couple of days; it could not be put down in any regular order. The attack might last a week, a month, or even six months. The patient might have an attack a number of winters in succession. Such patients were private, did not enter hospitals, were not sick enough to be in bed, but were very miserable. The fever was not symptomatic of any disease, but was the disease itself, and when it went away the patients were well. Such patients behaved very capriciously to remedies. Some responded to quinine, others did not; some to arsenic, others not. The only thing which would with certainty stop the fever, for a time at least, was to send them away from New York, but it might return when they came back.

While the discovery of a micro-organism as the cause of intermittent fever was very interesting, and made our knowledge much more definite, yet we as practitioners should recognize these other fevers, which as fevers, not as catarrhs or catarrhal fever, or anything else, made people sick, and the point of practical importance was to find some way to cure the fever. We went on trying to manage these cases with the idea that they were malarial fever, but we did not know whether they were or were not, and some improved while some did not under the use of the antimalarial drugs. We should find a better way of treating such patients, for, while they did not die, they suffered a great deal.

Dr. L. Emmett Holt, in speaking on this topic, said he had been surprised to find how many cases of bronchopneumonia, in the first two years of life, gave a distinctly remittent temperature, and which he once thought might be due to malarial infection, but now was convinced was not, and did not respond to quinine. He used to see, when connected with a West Side dispensary, a good many cases of malarial fever in children coming from along the Hudson River and canal boats, and remarked on the uniformity of enlargement of the spleen shown by palpation, more rarely by percussion. In doubtful cases, where the spleen was enlarged and there was prompt response to quinine, the evidence was strongly presumptive of malaria. Few cases originated in New York, according to his experience.

Dr. Simon Baruch said that he hoped the paper of Dr. James would give a deathblow to the malarial infection which (metaphorically speaking) seems to have taken

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possession of the medical and lay public in this city. When he came here from the South, ten years ago, he found a perfect quinio-mania prevailing; a credulous public sought in this agent an unfailing remedy for a large catalogue of diseases, because malaria was supposed to be omnipotent and ubiquitous. He claimed that this was due to errors in diagnosis. 1. The combination of solar heat (above 60° F.), moisture below the saturating point, and vegetable matter (not living), which is necessary for the production of true malarial fever, does not exist in New York City. 2. Experience has taught that the paved streets of cities of the temperate zone offer an uncongenial soil for malaria. 3. Although the prognosis of malarial fever, as we are taught, is almost invariably favorable, the Board of Health reports over one death from malarial fever for every day from January to April, with an average temperature of two degrees above the freezing point, in the years 1876–1883.

Dr. Baruch cited the report of Dr. Charles Russell, who investigated two hundred and thirty-one such deaths in 1876 for the Board of Health, and found it impossible to obtain definite information from physicians reporting these cases in two-thirds of the cases. Dr. James' microscopic and Dr. Biggs' pathological evidence constitute a complete vindication of the views he had long ago expressed and which have hitherto been received with much scepticism.

Dr. James, in closing the discussion, impressed the importance of not confounding typical intermittent fever, in which the plasmodium was found in the blood, and which gave a clear clinical history and showed enlargement of the spleen, with other forms of fever, whether the latter might or might not yet be proved to be due to some specific germ.

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Stated Meeting, April 2d, 1891.

LUPUS.

By HENRY G. PIFFARD, M.D.,
NEW YORK.

Mr. President and Fellows of the Academy:—In compliance with the request of your presiding officer, I propose this evening to lay before you a few facts and conclusions relative to an affection of the skin which has been brought, at the present time, into considerable prominence through the supposed discovery of a new and efficient means of treatment and cure—I allude to lupus.

In order, however, that we may fully understand the proper limitations that should be thrown around the use of this term, it will be necessary to briefly review the subject from an historical standpoint. This is the more important, insomuch as the name has not at all times been held to embrace exactly the same pathological processes, at one time being permitted to comprehend a greater, and at another time a less number of clinical features. In fact, it would be impossible, even at the present day, to obtain an absolute consensus among dermatologists as to what lesions and what morbid processes are rightfully entitled to the name of lupus.

If we search the early records of medicine we find that the disease was known to the Greeks under the name of esthiomenos—a term which is preserved even to the present day as the title of certain varieties of lupus affecting the vulva. (The fact of these affections being really lupus has been recently questioned by Dr. R. W. Taylor.)

Celsus employs the term struma, which he describes to

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be a tumor in which, beneath a crust of pus and blood, things like small glands arise, which are particularly troublesome to the physician, for they excite inflammation and never maturate properly; and whether they be treated with the knife or by remedies, they generally spring up again by the side of the cicatrix, but most frequently after the use of local applications; hence they are always tedious. We can hardly recognize lupus in the description, except from the tendency of the lesions to relapse after removal by the knife or otherwise.

Coming to more recent times, we find Daniel Turner, in his "Treatise of Diseases Incident to the Skin" (1714), making it a variety of cancer, of which he says: "If it seize upon the Legs and Thighs it is termed *Lupus*, the Wolf; for that it is, say some, of a ravenous Nature, and like that fierce Creature, not satisfy'd but with Flesh."

Plenck also (1776) confounds lupus with cancer, and gives a description which is equally applicable to both affections, as follows: "TUBERCULUM CANCROSUM, *quod etiam noli me tangere vocatur, est parvum tuberculum in facie, rubrolividum, quod multos annos quietum manet, si vero medicamentis multum irritatur, dolere incipit et in cancrum nerveum faciei obit.*"

Willan, Biett, Cazenave, and others, in the early part of the present century, contributed much to our knowledge of lupous affections, but the teachings of Bazin, *circa* 1855, created a veritable era in the history of the disease. This writer boldly declared his conviction that lupus was not a purely local affection, but was simply one of the cutaneous expressions of the strumous or scrofulous diathesis, as these terms were then understood. Hardy, his eminent colleague at the Hôpital Saint-Louis, followed him in this, and in his treatise on diseases of the skin used the word "scrofulides" as a collective designation for the various cutaneous affections which, in his opinion, were of a scrofulous origin, including lupus among the rest.

The present writer's experience led him to accept the views of Hardy in this regard and to incorporate them in

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his "Elementary Treatise on Diseases of the Skin," 1876. These notions, however, did not meet with general favor in this country at that time, and, in fact, were severely criticised. The late Sir Erasmus Wilson, probably the ablest and most philosophic dermatologist that ever lived, emphatically expressed his belief in the dependence of lupus on the so-called scrofulous diathesis.

Now, on what evidence did these acute observers and able thinkers base their conclusions? Simply on the easily verifiable fact that lupus was so frequently associated with that chronic and usually fatal disease of the lungs which has been known to us under the names consumption, phthisis, catarrhal pneumonia, and pulmonary tuberculosis. This association was either by heredity or propinquity, or by the fact that phthisis pulmonalis was the usual termination of long-standing cases of cutaneous lupus. This association, too, was so frequent and so close that it seemed to the writer impossible to accept any other idea than that which predicated a common underlying cause for both phthisis and lupus, and this view he has constantly maintained and taught for the past fifteen years.

In 1877 he went a step further and declared, in a paper read before the Medical Society of the State of New York, that lupus was infectious, using the following words: "Another peculiarity is its gradual extension and involvement of new regions by an apparently infective process, similar to, but less in degree than, that manifested by cancer. . . . This infective quality is evidenced by the fact that if a patch of lupus be incompletely destroyed the disease will most certainly return. . . . A consideration of these two points—namely, the extreme viability of the cells, and their infective quality—gives us a clue to their appropriate treatment."*

Just two weeks later Mr. Jonathan Hutchinson wrote in the *Med. Times and Gazette* (August 4th, 1877) as follows:

* Medical Record, July 21st, 1877.

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"The mode in which lupus extends itself, and more especially the manner in which multiple patches are developed, is well worthy of investigation. My impression is that the processes are by cell infection and very similar to what we observe in cancer."

It seems to me not a little remarkable that the same idea should have found almost simultaneous expression by two independent workers and in almost the same words.

Three or four years later Dr. Robert Koch announced his discovery of the bacillus of tuberculosis, and clearly set forth its association with pulmonary phthisis. This in turn was followed by the discovery of an apparently identical micro-organism in one of the forms of lupus and in certain other cutaneous lesions.

Those who, prior to these recent discoveries, had claimed a close association between lupus and pulmonary tuberculosis, arrived at their views by inductive reasoning from clinical phenomena, and should certainly feel under great obligations to Dr. Koch and his co-laborers, who so strikingly verified their prior conclusions.

Returning now to the views of Bazin and Hardy, we find that the affections which by almost common consent received the name of lupus do not embrace all of the lesions included by the latter (Hardy) under the title of scrofulides. This, perhaps, will be made more clear by the following table:

SCROFULIDES (HARDY).

Phlegmonous		
Erythematous		Lupus erythematosus
Corneous		
Pustular		
Tubercular	With superficial ulceration	Lupus vulgaris
	With deep ulceration	Lupus exedens

In reference to the above, it may be stated that the tubercle bacillus has thus far been demonstrated in but one of the above-named affections, namely, lupus vulgaris. On

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the other hand, it has been found in certain lesions of the skin which have not as yet been classed as varieties of lupus. I allude more particularly to the so-called tuberculosis cutis of Riehl, Morrow, and others.

If now we accept the prevailing doctrine that certain cutaneous affections are the result of infection by the tubercle bacillus, it may be convenient to group them together under the common title of tuberculides, and I take the liberty of placing by their side three other affections in which the bacilli have not as yet been found, but in which I believe they will be; these I mark as doubtful in the following table:

TUBERCULIDES.

Phlegmonous scrofulide (Hardy)?
Lupus erythematosus?
Lupus vulgaris.
Lupus exedens?
Tuberculosis cutis (Riehl, Morrow, *et al.*).

The phlegmonous scrofulide or chronic intradermic abscess is a most typically scrofulous affection, and merits more attention than it has hitherto received.

Lupus erythematosus is at present the subject of a discussion as to its right to bear the title of lupus at all; it being claimed by some that it bears no relationship whatever to L. vulgaris. I agree, however, with those who consider it a variety of lupus, and it is unquestionably a scrofulide, using this term in the sense understood by Hardy.

The affection itself was first carefully described by the old French dermatologist Biett under the name of *erythema centrifugum;* later it received the name it now usually bears, but quite recently Unna, of Hamburg, has returned to Biett's old name, adding, however, the prefix *Ul.*

The lupus exedens, included in the above list, is rejected as a variety of lupus by many modern writers, who con-

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sider it rather as a variety of epithelioma. Personally, I have been unable to regard it in this light, and still hold to the views expressed by me some years ago.*

There is, however, I believe, a much closer connection between epithelioma and lupus in all its varieties than is at present generally admitted, but the evidence bearing on this I will not detain you with this evening.

I shall not allude to the clinical features or nosology of lupus, as these are fully described in the standard text books; nor will I take up your time this evening with the pathological histology of the affection, as it is a subject broad enough to receive separate consideration.

It is to the treatment of lupus, however, that I will ask your special attention, and in doing so will briefly describe the chief methods that have been in vogue during the past twenty-five years, and conclude with a particular consideration of the results obtained by the plan proposed by Dr. Robert Koch, of Berlin.

Without referring to methods of treatment which have proved absolutely inefficient, we may go back to the observation made many years ago by Hardy, that facial lupus had disappeared after an attack of facial erysipelas. On this he based his substitutive method, which consisted in the induction of a severe local artificial inflammation, on the subsidence of which the lupus was found to be cured or benefited. His favorite application for the purpose was an ointment of the biniodide of mercury, which he used in varying strengths, even to the extent of mixing the salt with an equal weight of lard and applying it to the affected parts. The effect, of course, was to excite an intensely acute inflammation, varying with percentage strength of the ointment and the special reactive susceptibility of the patient. The first of these varying factors it was, of course, easy to determine, but the local reaction that was likely to follow a given application was an unknown quantity until after it had been made. In

* "Elementary Treatise on Diseases of the Skin," 1876.

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other words, it was impossible to gauge in advance the most desirable potency to employ. If the mercurial ointment were too weak, the inflammation excited would not be sufficient to effect the desired end, but instead would do harm by stimulating a more rapid extension of the disease; for we must remember that a lupus irritated is, like its namesake, a much more troublesome affair than if quietly left at peace. *Per contra*, if an excessive strength were employed, the drug might cause a greater destruction of important tissues and organs in a short time than the disease itself would be capable of doing in several years. The objections, then, to this plan were its uncertainty and general unreliability. Moreover, it was exceedingly painful.

Turning from the substitutive to the destructive methods of treatment, we find that the German plan of boring into the lupous tissue with pointed sticks of nitrate of silver was used to a considerable extent by surgeons in all countries, but is now pretty much abandoned. It was, perhaps, better adapted to the form known as lupus vulgaris than to the other varieties of the affection. It was, however, found to be, in the majority of instances, inefficient. No matter how thoroughly or deeply you plunged the caustic point, a few outlying cells were almost sure to escape destruction, and in a few weeks or months the disease again became manifest. It is this persistent tendency to relapse that makes the affection so rebellious and difficult of radical cure. In the efficient treatment of this disease, the one thing that we must bear in mind is the necessity for the absolute destruction of every portion of the affected tissue. Every cell, every bacillus, every atom or particle of matter capable of conveying infection or of reproducing the disease *in situ*, must be completely destroyed. This fact was clearly apparent to attentive clinical observers before we knew of the existence of the bacillus. Now that we are able to charge this insignificant micro-organism with being the agent of infection, we become more emphatically im-

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pressed with the absolute necessity for the complete and thorough destruction of the diseased tissues, if we are to expect immunity from relapse. If we concede that this is the true theory on which to base our treatment of lupus, we have nothing further to consider than the simple question, What is the best *modus operandi* wherewith to fulfil the theoretical demand?

Undoubtedly the first thought that would occur to the practical surgeon would be to promptly excise the diseased tissues, and this is unquestionably the proper course to pursue in certain selected cases. When the lesion is small and favorably situated, the knife affords the quickest and best means of relief; and even in larger lesions, an inch or more in diameter, excision may be employed, provided the neighboring skin can be utilized wholly or in part to cover the wound. In operating with the knife, at least a quarter of an inch of apparently healthy skin surrounding the lesion should be removed, that is, if we desire and expect to prevent relapse. The marginal allowance should be even greater than if we were dealing with an epithelioma, as the lupous infiltration is more diffuse and branches out more widely and deceptively than in the other affection.

Of the two diseases, the writer has certainly found epithelioma much more amenable to treatment than lupus; that is to say, the relapses after operative interference are less frequent in epithelioma than in lupus. It is a comparatively easy matter to remove a hard epitheliomatous nodule with the knife, cutting through the entire thickness of the skin and dissecting it up from the connective tissue beneath. With lupus, however, it is by no means so easy; the diseased skin is softened, broken down, and rotten throughout a varying thickness, and is not readily detached from the connective tissue beneath; and on more than one occasion I have been obliged to change from the knife to some other implement in the middle of an operation. The cases, then, of lupus in which the knife is to be absolutely preferred, are greatly in the

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minority. The majority of cases demand some other treatment.

The direct application of the actual cautery to the surface of the morbid tissue has been frequently employed in the past, but is rarely used at the present time. It was found that relapse was an almost constant feature. The reason for this is not far to seek: the surgeon rarely had the nerve to keep his cautery in contact long enough to destroy the deeper layers of the skin, for fear of resulting deformity or injury to neighboring parts. The actual cautery, then, applied superficially, is not to be recommended.

Potential caustics, like potassa fusa, Vienna paste, etc., have also been employed, and are reasonably effective when vigorously used, but their action is not under ready control and they are liable to do unexpected damage.

Some years since Hebra recommended the use of arsenic applied in the form of paste, claiming that the drug exerted an elective influence on the diseased tissue, while sparing that which was sound. This is to a certain extent true. The arsenic appears to attack the lupous tissue in preference to the healthy, but its action does not seem to be sufficiently diffused, and small outlying cell collections, beyond the visible margins of the disease, escape destruction. The arsenical application, moreover, is exceedingly painful, and narcotics become necessary for several hours and even days.

In 1870 Volkmann introduced a new method of treatment—namely, the mechanical removal of the infiltration with the curette. The simplicity of the method was its chief charm. The lupous tissue breaks down under the curette like old cheese, and the little spoon removed it without difficulty. The wound healed kindly, and the scar was a good one—that is, as long as it lasted. Radical cure, however, was the exception, relapse was the rule; and the reason for this was clear. As the infiltration is softer than the normal tissue, there is no difficulty in removing most of it in this way, but unfortunately it is

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rarely possible to do more than this. The still undamaged connective tissue resists the action of the curette and outlying cells escape. Removal of *all* the lupus cells (and bacilli), however, is the necessary condition of ultimate success, and this is not practically effected by Volkmann's operation. In fact, none of the methods alluded to were capable at a single operation of permanently curing the majority of cases of lupus. A better means of treatment was urgently needed, and the present writer, about the year 1875, sought to accomplish this end by combining Volkmann's raclage with the use of caustics, actual or potential. In 1877, in the paper read before the State Medical Society, I detailed the results obtained in a series of cases treated in various ways, and recommended the use of raclage, followed by the immediate application of the actual cautery, as the means most likely to secure a permanent cure in the majority of cases. It must not be thought, however, that by it the majority of lesions will be cured at the first operation. Many are, but a still greater number exhibit relapses in from one to six months and will need to be operated on again; and the more extensive the lesions the greater the probability of their requiring two or more attempts before a permanent result is secured. This combined method, however, of scraping and cautery, has been the one I have usually followed during the past fifteen years.

A few years since, Vidal, of Paris, advocated linear scarifications; but this plan, I believe, has fallen into disuse, owing to the fact that relapse was the rule and permanent cure quite the exception. Quite recently Professor Leloir,* of Lille, has published an article on the treatment of lupus in which he strongly advocates the combination of scraping with the actual cautery, and which he speaks of as his own "mixed treatment," overlooking the fact that it had already been in use in this country for some fifteen or sixteen years.

* "Je commence par attaquer rapidement, grossièrement, brutalement le gros placard lupeux avec une grosse curette de Volkmann, et à enlever aussi

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In carrying out this combined or mixed treatment, I originally advised the most thorough scraping, followed by the cautery at a white heat. Subsequent experience, however, taught me that a red heat was preferable. The white-hot metal causes an instantaneous carbonization of the tissues with which it comes in contact, and which acts as a protection to the deeper parts of the skin, and in this way many of the cells (or bacilli) escaped destruction. The platinum at a red heat, however, burns more deeply, and I now think more thoroughly accomplishes its intended purpose.

During the past year I have practised to a certain extent still another method, which I believe to be original. Briefly it consists in making scarifications and cross-scarifications with a small, sharp-edged platinum knife heated to dull redness by electricity. With this instrument I cut through the entire thickness of the skin, commencing the incisions in the apparently healthy skin, and carrying them through into healthy skin on the opposite side. The cuts are made as closely together as practicable, and, when the lesion is not too large, cross-cuts are also made at the same séance. The entire operation may, and I believe should, be performed without the loss of a single drop of blood. This is to be accomplished by the careful regulation of the heat. The platinum knife at a white heat will draw blood as freely as cold steel, but a dull red heat sears the vessels before it divides them. I am not prepared to advocate this method in preference to the one previously described, as a single year's experience in the use of a particular operation counts for little in this disease.

Of the plans of treatment that have been in vogue, excision and the curette-cautery are the ones which may be

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le plus de tissu pathologique possible. Puis après avoir pratiqué l'ischémie avec des tampons d'ouate, j'ai souvent pour habitate de cautériser au moyen du thermo ou du galvano-cautère le tissu pathologique restant" (Journal des Maladies Cutanées et Syphilitiques, January, 1891).

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practised with the least inconvenience to the patient, and are the ones that are followed with the most speedy results. Excision should, of course, be practised with antiseptic precautions, and, when applicable, is followed by prompt healing; and the cure will be permanent provided the necessary condition, absolute removal of all the diseased tissue, has been accomplished. When the curette followed by the actual cautery is employed, a perfectly aseptic wound is left. This may be packed with a little sterilized cotton, just as much as the moisture of the part will cause to adhere, and the patient goes about his business without requiring further attention. At the end of ten days or two weeks if the lesion has been a small one, or of a longer time if larger, the crust, which consists of cotton, dried secretion, and carbonized tissue, drops off, leaving a perfectly formed cicatrix of rosy hue, but soft, smooth, and pliable. Occasionally a little pus forms under the crust before it falls, in which case any convenient antiseptic may be injected under it two or three times a day until it is detached. In extensive lesions—that is, above one inch in diameter—the crust may be shed before the wound is completely healed. As a rule, the little simple ulcer that is revealed completely cicatrizes in a few days. When this is accomplished the inexperienced surgeon—inexperienced, I mean, in the treatment of lupus—is disposed to congratulate himself and his patient on the successful result of the treatment. In a month or two months or three months, or even six months, he may return to the surgeon with clearly marked evidences of relapse. To effect an apparent and temporary "cure" of lupus is a comparatively easy matter, and may be accomplished in a variety of ways; but the dermatologist knows that a permanent cure will tax his skill and experience to the utmost, and frequently can only be obtained after a number of operations. When the lesions are small and readily accessible, I believe that in most cases they can be cured at a single séance, but when larger we can rarely hope for more than partial success at the first attempt.

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The operation, however, should be repeated as soon as the relapsing points can be clearly recognized. The intrinsically treacherous nature of lupus can only be fully appreciated by those who have had much to do with its management.

In the majority of cases I operate without the use of an anæsthetic; but if circumstances demand this agent, we must remember that ether is excluded on account of the danger of fire, and chloroform on well-known grounds. This leaves us protoxide of nitrogen as a general, and cocaine as a local anæsthetic. This latter may be employed by hypodermic injection or by cataphoresis.

Considering now the difficulties that surround the permanent cure of lupus by even the best-devised surgical procedures, it is not surprising that when Koch announced that he had discovered an agent that exerted an unmistakable influence on the disease, his assertions should be speedily put to the proof.

It must be clearly understood that Koch has at no time distinctly asserted that his "lymph" would cure lupus, or, for that matter, any other disease. As a result of his numerous experiments on animals and a few on men, he felt authorized to submit his remedy to public trial by those whose field was in clinical rather than in laboratory work. He, however, made certain preliminary statements as to the results that he had personally observed. These may be briefly referred to.

After an injection of one or more milligrammes of his "lymph" in persons free from tuberculosis (or bacillary infection) no change in their general state was observed. The action of the lymph appeared to be *nil.* If, however, they were suffering from tuberculosis, internal or external, the injection was in a few hours followed by pyrexia of a more or less decided character. After a day or two this subsided, and could again be induced by a renewal of the injection. In those, moreover, in whom the tubercular lesions were on the surface and visible, as in lupus vulgaris, certain very remarkable changes took place. If

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the lesions were not ulcerated, they became redder and swollen, and in some cases a serous exudation appeared on the surface. The lupous tissue itself took on a necrotic aspect, and with the dried secretion formed a crust, which became detached in two or three weeks, much after the manner of the crust which follows cauterization, leaving a soft and pink cicatrix. This might occur after a single injection, but, as a rule, several were required to produce the result described. In cases of ulcerated lupus, healthy granulations appeared and the ulcers gradually cicatrized. These statements by Koch have been repeatedly verified, both in Europe and in this country, and the early reports that we received of the progress in the treatment of lupus by the lymph were exceedingly encouraging. Patients who had undergone the Koch treatment were discharged almost daily from the general hospitals as "cured." These cases were in the beginning treated almost exclusively by those whose experience lay rather with pulmonary than with cutaneous tuberculosis, and who had made a study of tuberculosis in the living with their ears rather than with their eyes. It is safe to say that very few, if indeed any, of these cases were really cured. In many of them the characteristic "apple-jelly" granules were plainly visible at the time of their discharge from the hospitals, while in the others a few weeks sufficed to reveal unmistakable evidence of relapse. In other words, the patients were no better off than if they had undergone the ordinary surgical procedures after which relapse so frequently occurs. In fact, they were perhaps not so well off, as many cases of lupus have been permanently cured by surgical means, while we do not at this moment know that in a single case treated by Koch's lymph the same result has been obtained. Six months at least, and possibly a year, must elapse before an absolute verdict can be rendered in any given case. When the cicatrix has lost its rosy hue and become completely blanched, we may begin to congratulate ourselves on having obtained a permanent cure, and not until then.

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The reactions, both general and local, described by Koch as occurring in lupus vulgaris, have in the main been verified by subsequent experimenters, but cases have been reported in which there has been general without local reaction, and *vice versa*. In erythematous lupus local reaction has, as a rule, been absent, which gives a certain measure of support to the opinion held by some that this affection is not tuberculous and not entitled to the name it commonly bears. There have been cases, however, diagnosticated erythematous lupus, which have exhibited the reactions common to lupus vulgaris, followed by subsidence of the lesion.

The general statement made by Koch that reactions, general and local, occurred only in those who were suffering from tuberculosis from bacillary invasion, whether of the skin or of internal organs, has in the main been verified. This carries with it the corollary that reactions will not occur unless the subject of the injection be tuberculous. This also has in the main been verified. Hence the injection of the lymph may in cases of doubt serve as an aid to diagnosis. Unfortunately these general statements are not absolute, and numerous exceptions have already been noted. We cannot, therefore, place implicit reliance on the data furnished by the injections in the diagnostic examination of obscure lesions or symptoms.

The remarkable fact, however, remains, that the Koch lymph does certainly produce decided changes in lupus, and changes that are apparently in the direction of cure, and changes that have not been produced by any other medicinal agent at present known to us.

During the last few years organic chemistry has given us a considerable number of exceedingly active agents that have been largely used as symptom remedies by the profession. We can beat down a fever with antipyrin, we can compel sleep with sulfonal, we can relieve pain with phenacetin, and, owing to the energetic action of these drugs, we can obtain the desired results with great promptness; and so with a dozen other active agents that might

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be named. We must remember, however, that we cannot always do these things with impunity. An active drug is always a two-edged sword, mighty for good when properly used, but capable of doing equal damage when handled ignorantly or recklessly. So it is with the Koch lymph. Its administration is not unattended with danger. Three instances have already been reported in which death followed the injection of the lymph for lupus; in one case the fatal event occurred in thirty-six, and in the other twenty-one hours after the first injections, and in both of these the dose administered was well within the limits of safety as assigned by Koch.

The details of these cases were briefly as follows:

CASE I. (reported by Jarisch).—A girl, seventeen years of age, affected with ulcerating lupus of the face, after a single injection of two milligrammes was a few hours later seized with a chill followed by increase of temperature, reaching in fourteen hours 41.1° C. (nearly 107° F.). During the following day the temperature varied between 40° and 41° C. In addition, there was repeated vomiting, continual somnolence, involuntary stools, and a very feeble pulse. She died at the end of thirty-six hours.

CASE II. (Von Burckhardt).—A female suffering from lupus of the face and nasal fossa, with smaller lesions on the lower extremities, received three injections at intervals of three days. The first injection was five, the second eight, and the third ten milligrammes. The first two injections raised the temperature to 39.5° and 40°. Four hours after the third the temperature was 39°, and two hours later at 40.2°, and the patient complained of a sense of weight in the sternal region. This was accompanied with dyspnœa and cyanosis. The urine was scanty and found to contain albumin, which had not previously been present. Death occurred in twenty-one hours (Thibierge).*

CASE III. (Service of Dr. Blanc at the Charity Hospital, New Orleans).—A colored boy, seventeen years old, and healthy except for a lupus of face and neck, received January 15th an injection of 0.0001; January 16th, 0.0002; and January 17th, 0.0005. On that day symptoms of nephritis became apparent, and he died two weeks later.†

* Annales de Derm. et de Syph., January, 1891.

† N. O. Med. and Surg. Jour., March, 1891.

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Other grave, though happily not fatal, complications following the injection of lymph in lupus are cited by the "*Commission des Médecins de l'Hôpital Saint-Louis*" as follows: icterus, albuminuria, hæmaturia, engorgement of the spleen, pulmonary congestion, myo- and endocarditis.*

In all cases in which reaction was developed, the patients have suffered extreme bodily discomfort during the period of pyrexia, varying of course with the violence of the reaction and the susceptibility of the individual.

If we now turn from the practical to the theoretical side of the question, we are met by one striking fact, namely, that we have in the Koch lymph an agent whose physiological action is, so far as I know, unique. Arsenic given in doses capable of producing immediate and striking effects will exhibit them, both in those who are in sound health as well as in those who are diseased; strychnine will tetanize both the sick and the well; atropine will dilate the pupil, whatever the state of the general health. And so with every other active drug that we have occasion to use; the tendency of its physiological or pathogenetic action is the same (excepting, of course, instances of individual idiosyncrasy). Not so with the Koch lymph. When injected into a person of sound health, it appears to be inert; but if injected into one suffering from either internal or external tuberculosis, we immediately perceive that we are in the presence of an agent of great power, and one whose effects we have as yet no means of controlling. This selective power possessed by the lymph for tuberculous tissue is indeed the greatest mystery, and the most interesting question with which we, as physiologists or pathologists, have to deal. Is it due to a direct specific influence on tuberculous tissue, or is it due to the fact that the diseased foci are simply less capable than the sounder tissues of resisting the action of the medicament? Unfortunately this question cannot at present be answered.

The changes that take place in lupous tissue under the

* Thibierge, loc. cit.

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influence of the lymph are much more readily explained. The result of the injection is the induction of a simple inflammation with the four classic signs, rubor, tumor, calor, and dolor, and the microscope informs us that we have congestion, diapedesis, and exudation. In other words, we have practically the phenomena exhibited by an attack of ordinary idiopathic erysipelas, or readily producible by the biniodide frictions of Hardy.

In the few instances, however, that have been reported in which there was little or no local reaction, but in which the cutaneous lesions subsided, we must look elsewhere for an explanation.

It is a well-known fact that many cutaneous diseases will disappear at the onset of acute febrile ailments, and I have myself seen an erythematous lupus fade away during an attack of typhoid fever. We need not, then, be wholly surprised that the lupus yields in a measure to the repeated pyrexiæ induced by the Koch injections. With the facts as disclosed in this brief review before him, the surgeon is in a position to form his own conclusions as to the desirability or propriety of recommending this method of treatment to his patients. If pressed for my own personal opinion, I can only say that I believe that the surgical procedures heretofore in use are to be preferred to the Koch injections, on the ground of better result, greater safety, and less suffering and inconvenience to the unfortunate victims of the insidious, obstinate, and treacherous disease we have considered this evening.

DISCUSSION.

DR. H. N. HEINEMAN gave the results of treatment of nine cases of lupus with tuberculin, most of which had been seen at the Mount Sinai Hospital. In his preliminary remarks he cautioned those who intended to try the method not to use large initial doses. For instance, it had been said that in some cases of lupus an initial dose of ten milligrammes might be given, but it was much safer to begin with the usual minimum dose and gradually work up. In one of his cases a dose of three milli-

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grammes had produced such reaction that he sat up with the patient all night to make sure that he would not slip away. The treatment in most of his nine cases had been begun four or five months ago. The duration of the disease had varied from three to fifty years. In one case, when the dose was increased, it seemed to cause rapid spread of the disease, but on reducing it again to three milligrammes healing took place. In most cases there had been more or less improvement apparent, but of only one could it be said that there had been all but a complete cure. He had no doubt but that a quicker and more complete result would be obtained by combining local and tuberculin treatment. This course was being pursued abroad.

DR. H. P. LOOMIS illustrated, with lantern slides made from negatives by Dr. Fuller, cases of lupus treated by tuberculin in Bellevue. The cases described were four in number. In most the change had not been great. In an old woman who had infiltration of the face and a few apparent ulcers, and also a large epithelioma below the cheek bone, the thickening and infiltration over the entire face and the small ulcers disappeared, but no effect was produced upon the epithelioma. The injections were continued until they ceased to produce any general or local reaction.

DR. R. W. TAYLOR said that while it would seem that the theory of the bacillary origin of lupus was the correct one, yet it was not so generally believed in as the author thought. We were not yet in a position to speak of the mode of implantation of the bacillus, its mode of propagation in the skin, and the appearance presented by it in newly infiltrated areas. Within the last few years other affections had been regarded as allied to lupus (not conforming to the classical description of this disease) upon the supposition that it was of tubercular nature. Perhaps this is correct, but the fact has not been clearly made out as yet. The opinion which had been expressed by the reader, that most cases of tuberculous skin were associated with tuberculosis of the lungs, was in direct opposition to the observations of all others. In how many cases of lupus did one find associated pulmonary disease?

He agreed in the treatment recommended by Dr. Piffard, but thought that caustics would in many cases be

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more efficient and more easily handled than the actual cautery.

DR. G. H. FOX, speaking of the treatment of lupus vulgaris, said he had never seen a case, either limited or extensive, in which the curette or some other method was not better and more agreeable to the patient than the knife. He did not approve of the galvano-cautery, claiming that it necessitated the destruction of too much healthy tissue in order to get rid of all the disease. He preferred caustics, especially in connection with the curette. He favored the action of a weak caustic, as pyrogallic acid, which kept up a suppuration, to more active caustics which left a deep slough. Linear scarification was desirable in some cases of lupus of the nose. The dental burr was invaluable in the removal of small nodules of recurrent disease disseminated through cicatricial tissue.

Regarding Koch's lymph, while it had not fulfilled first expectations, yet he thought it would prove of considerable value, especially in connection with other forms of treatment, in cases which proved rebellious to surgical measures alone.

DR. PRINCE A. MORROW said that, in common with most dermatologists, he had come to accept the view that lupus was a local tuberculosis. It was worthy of note, however, that many dermatologists by no means subscribed to this view. Some did not recognize the bacillus of Koch as the pathogenic agent.

With regard to tuberculin, he thought Dr. Piffard had done well to compare this method of treatment with those of a local destructive nature. He had had opportunity to examine a number of cases subjected to the Koch treatment. Certainly the results in some were most striking. At the same time he did not think that dermatologists who were familiar with the chronic, the almost intractable nature of this affection, with its tendency to recur, would be disposed to accept the statement that by the injection of a lymph into the system the tuberculous tissue would be attacked and destroyed, and a cure be effected in the brief period of a few weeks. This claim was regarded as premature, and had been received from the first with very marked incredulity on the part of most dermatologists. It was thought that six to eighteen months would be necessary to decide upon the cure of the disease. It had been found that the majority of the cases which had been

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reported as brilliant cures showed, within a short time, signs of relapse, and in some cases new foci of disease developed, and in some the condition was worse than when the treatment was begun.

DR. EDWARD B. BRONSON had had under observation a few cases of lupus treated by injection of tuberculin, and the impression which the mode of treatment had made upon his mind had been unfavorable. One case was apparently progressing toward a cure when the patient left the hospital. In most of the cases, however, although there had been temporary improvement, the ultimate result had been very unsatisfactory. In one case, treated three months, there had been no result whatever. In general, time spent in making the injections seemed to be time lost. A much more satisfactory result would have been obtained by surgical procedures.

Referring to Dr. Fox's suggestion to keep up a low form of suppuration, he expressed the opinion that it was contrary to good surgery, and said he preferred to effect a cure as soon as possible. It seemed to him that suppuration was a thing which ought to be avoided.

DR. PIFFARD closed the discussion. He said it was true that in the beginning lupus seldom showed associated lung trouble, but if the cases were allowed to go on they were likely to ultimately kill the patient by phthisis or epithelioma. Nor were we likely, in cases in which tuberculosis of the lungs had existed for some time, to find lupus, for the reason that the bacilli had found a better place than the skin. He had had a case of lupus in a woman in whom it had developed two years after her marriage to a man who had tuberculosis of the lungs.

PUBLIC BATHS.

BY SIMON BARUCH, M.D.

IN the interest of public sanitation, but chiefly in the interest of that portion of our community which is waging an unequal struggle for existence, and which therefore claims the sympathy of brotherhood from us, I ask the support of this Academy to a measure which is of immense import to both.

The value of cleanliness as a hygienic measure does not

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require argument in this learned body, nor is it necessary to tell you how inadequate are the provisions for bathing in this city, for the poor, and even for the middle classes. The fact is daily under your observation that that portion of the community which is in greatest need of baths has the least facilities for them.

It would seem to be the duty as well as the interest of the more fortunate portion of the community to afford its employees, servants, laborers, tradespeople, and mechanics at least the same opportunity for keeping the skin clean and healthy which we regard as imperative in the management of our horses and other animals.

The medical profession is constantly forced to observe that the filthy condition of our poor is responsible for the spread of many diseases, which quickly find their way into the ranks of the better situated by means of domestics, laborers, and tradespeople. The so-called tenement odor, which so often offends our sensitive olfactories in crowded street cars, emanates from the decomposed secretions of the skin which have accumulated upon the persons and in the unventilated clothing of the poor.

It is therefore not only a moral obligation resting upon the wealthy portion of the community, but one arising from due consideration for the safety of our own households, to remove this remediable evil. *But, above all, it is the duty of our city authorities to do so.*

The modern sanitarian has learned that by cleanliness in the clothing, food, water, air, etc., much suffering and death may be banished from the land. It is our solemn duty to preach this doctrine at all times until it is fully appreciated. It requires no argument to convince you that every consideration of law, propriety, and sanitation demands that our city authorities should take immediate steps to secure to our laboring population, near their dwellings, the means of cleanliness and refreshment, health preservation and moral improvement, which the public bath is more capable of furnishing than many other more costly investments. The authorities of the city have

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already recognized this fact by erecting summer swimming baths.

Regarding the construction and maintenance by the city authorities of these summer baths as a precedent, I intend to urge upon them the value and necessity of continuing the public baths in a different form during the remainder of the year, when diseases arising from filth and lack of ventilation are most rife. To this end I would ask the co-operation of the Academy. To render this practicable I propose to offer them a method of bathing whose simplicity and cheapness will overcome every possible objection to public baths. As I have argued the subject before the Social Science Association, the County Medical Society, the Section of Hygiene of the Academy, and the Northwestern Medical and Surgical Society, I will not occupy your time by argument this evening, but simply state that the essential principle of these baths is the *abolition of the tub and substitution of the rain and shower baths.* The bather simply steps upon an inclined floor, draws upon a chain, opening a valve from which a shower of coarse spray of warm water pours upon him, while he soaps and scrubs himself. He thus has the mechanical effect of the falling stream, the soiled water being rinsed off rapidly and flowing off at once.

The advantages of this method are:

1. The saving of expense of purchase and wear and tear of tubs.

2. The saving of cost of time and labor by avoiding the filling, emptying, and cleansing of tubs for each bather.

3. The saving of time of the bather, and his more thorough cleansing.

4. The saving of space.

5. The economy of water. In the Juvenile Asylum we now bathe two hundred and eighty children instead of eighty per hour, in the same space and with one-eighth the quantity of water formerly used.

6. The absence of danger from communication of diseases.

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7. The refreshing effect of a brief cold shower following the cleansing bath.

When compared with the open swimming baths, which can only be used in summer and in restricted localities, the advantages of this bath are apparent.

The privacy and comfort of these baths, and their accessibility if built in the crowded tenement districts, where the poor may have them constantly before them, will surely induce them to cultivate habits of cleanliness whose physical and moral value cannot be overestimated.

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Stated Meeting, April 16th, 1891.*

IS EMBRYOTOMY OF THE LIVING FŒTUS JUSTIFIABLE?

By EGBERT H. GRANDIN, M.D.,

CHAIRMAN OF THE SECTION ON OBSTETRICS AND GYNECOLOGY, NEW YORK ACADEMY OF MEDICINE, ETC.

OF all the problems in obstetrics, the one propounded to-night is the most vexed, and the most important as well, in the light of the marvellous progress of abdominal surgery during the past decade. Every physician whose practice necessitates attendance on a woman during the supremest of her trials, when confronted by the necessity of destroying the lesser human life in order to succor the greater, must have felt instinctive repugnance; and every physician will hail with joy the advent of the day when the call for fœticide no longer exists, in that, through resort to the Cæsarean section, the babe may be saved and yet the mother not imperilled.

Ten years ago the answer to our question was necessarily affirmative. The maternal mortality from the Cæsarean section at the time was about forty per cent, on an average, hence absolutely no regard could be paid to the life of the fœtus. To subject the mother in those days to the Cæsarean section, except under stringent absolute indication, meant death to her, and with no certainty of saving the child. Ten years ago, cleanliness, to say nothing of antisepsis, was an almost unknown quantity in obstetrics; the proper method of suturing the uterine wound to guard against gaping and internal hæmorrhage

* In charge of Section on Obstetrics and Gynæcology.

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was as yet only on the verge of evolution; the peritoneal cavity, if not a *terra incognita*, was with the vast majority of men a *noli me tangere;* septicæmia was rife in our maternity hospitals. What wonder, then, that embryotomy was a beneficent necessity, and the Cæsarean section, particularly a successful one, was a *rara avis?* To-day our knowledge and our results are very different. Septicæmia during the puerperal state means simply faulty technique in the conduct of labor. The mortality from this cause has fallen as low as one-quarter of one per cent in our New York maternities. To-day we know how to effectively suture the uterine wound; to-day we do not fear entering the peritoneal cavity, saving many a life which formerly was doomed. The abdominal surgeon is prepared with his statistics of series after series of laparotomies, complicated and uncomplicated, with, in individual instances, a mortality of from one to five per cent. Enormous fibroids of the uterus are removed without an untoward after-symptom—an operation, let it be remembered, for the removal of a tumor which of itself rarely kills, and retrogrades at the menopause. In the face of all this, the time is certainly ripe for frequent discussion of this question of embryotomy. We may not solve our problem just yet in the desired direction, but, if I mistake not the signs of the times, the absolute certainty in the near future is that the physician will not be justified in sacrificing the living child because the maternal chances from the Cæsarean section are unfavorable. Modern methods of asepsis, and modern methods of operative procedure, are yielding results which will shortly prove that the only risk to which the Cæsarean section subjects the mother is shock. This factor, it must be granted, is associated to an equal degree with any and all of the methods which are at our disposal for the sacrifice of the child.

Aside from the operator himself, there are certain factors which militate against the relegation of embryotomy to its proper sphere—instances where the fœtus is dead.

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One factor, and a prominent one, is the lack of thorough education in obstetrics. Midwifery must be raised to a higher plane than it has as yet secured. While the art can never become a specialty, greater stress should be laid on its practice in our medical schools. The student should be told that in no given case can it be predicated that Nature will be equal to her task. He should be told to make it his rule in practice to examine every woman he is engaged to confine, in order to determine the configuration of her pelvis, and in order to estimate the probable size of the fœtus which must pass through this pelvis. Pelvimetry has with us been too much neglected, with the result that over and over again the forceps and version are resorted to in instances where accurate pelvic measurement would teach that they are both contra-indicated, from the side of the child as well as from that of the mother. The result of faulty methods of instruction, the result of blind obstetrical practice, has been most disastrous in our statistical data. Not alone have children been sacrificed, but women also, in instances where a sounder scientific training would have taught that the Cæsarean section carried with it no greater risk to the mother and offered hope of saving the life of the child. We must learn, then, to deliberately *elect* the Cæsarean section. This accomplished, we will cease mutilating children—a procedure which every one who has been called upon to perform it will admit is repugnant to his very nature.

I will not dwell at length on the moral side of this question of embryotomy. Theologians cannot decide it for obstetricians. "If you cannot extract the child without killing it, it is murder to kill it," is the edict of the Church, easy to pronounce by those who are never called upon either to extract or to kill; but it is an edict which could carry absolutely no weight with the obstetrician so long as the alternative of not killing the child was the death of the mother. We must view this question purely from a scientific standpoint, and criticise it in the light of

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established scientific facts. Such, at least, is the state of the question as far as the physician is concerned. With the laity the question is a very different one. If the solution of our query is to be left in the future, as it has been largely in the past, to the relatives of the fœtus the fate of which is at stake, embryotomy of the living fœtus will always remain a justifiable procedure. The layman does not care for scientific facts, and throws statistical data to the wind where there is a choice between embryotomy and the Cæsarean section. He will insist to-day, even as he always has, on the sacrifice of the child rather than that the woman should be subjected to an operation which in the popular mind carries with it almost certain death. As for the woman, it will be rare indeed that the maternal instinct is strong enough to enable her deliberately to select the Cæsarean section in order that her unborn babe may have a chance for life. The point, then, which we as physicians will have to face sooner or later, is: Should the laity have any voice in the decision whatsoever? As physicians, we are not to weigh the relative value of one life over the other. We are called upon simply to do our best by the two lives committed to our charge; and if we can once deliberately conclude that the Cæsarean section carries with it but slightly, if any, greater risk to the woman than does embryotomy, then it becomes at once our duty to elect the operation. Let me state distinctly what I mean by the term *elective* Cæsarean section. To take a concrete case: I am asked to attend a woman in her approaching confinement. I find on inquiry and examination that she is within a few weeks of term. External pelvimetry teaches me that her pelvis lacks the normal configuration. Internal pelvimetry shows shortening of an inch and a half to two inches in all diameters, or possibly only in the true conjugate. By means of external abdominal and combined abdomino-vaginal examination, I determine that the fœtus is probably of average size. Attempts at causing the presenting part to engage in the brim of the pelvis by means of

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downward pressure on the uterus suggest to me that this presenting part cannot readily enter the pelvic canal. I feel, therefore, that the chances are against the birth of a living child, either through the efforts of Nature or resort to forceps or version. I at once begin to prepare the patient for Cæsarean section, even as I would were the intended operation an ovariotomy. I clean out the intestinal canal; by means of daily baths I obtain ample function of the sweat glands; I have the room where the operation is to be performed thoroughly cleaned; I select the day and hour for the operation, placing it as near full term as is possible; about six hours before the operation I induce labor by one or another of the recognized methods, operating therefore under the best obtainable conditions. This woman's chances of recovery, it seems to me, are absolute, barring that bugbear of all surgery—shock.

In this supposititious case, I have selected, it will be noticed, an instance of slight pelvic deformity; and, further, the pregnancy has already advanced too far for anything to be gained by the induction of premature labor. I take it for granted that all will accept the Cæsarean section under the absolute indication—that is to say, where the true conjugate measures less than two and one-half inches; I further concede that where the case is seen early enough the induction of premature labor should always be elected. Now, in this same case, can I, or will I, elect to perform embryotomy? No, but, having first given Nature a chance, I will resort to the forceps or version, or to both; and finally, these failing, perform what may turn out to be a very difficult craniotomy. The already exhausted woman is subjected to the further exhaustion which is associated with a protracted embryotomy; further, she is subjected to the risk of deep cervical rupture with profuse hæmorrhage; further still, there is risk of uterine rupture, to say nothing of fistulæ or deep laceration of the pelvic muscles and fascia, which form wide avenues for the entrance of the pathogenic

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germ. Is the woman's chance of recovery as great as if I had deliberately elected the Cæsarean section? These companion pictures are from life. I have seen deeper shock after embryotomy than after the Cæsarean section; I have met with profuse hæmorrhage after craniotomy; I have yet to witness sepsis after either, and I have yet to lose a case from cause directly traceable to the operation after either. But my experience with both operations has caused me to waver somewhat from my early training, and has led me to formulate for myself the following rule of practice, in which I believe the results in the next few years will justify me: In hospital practice I shall urge, and where possible perform, the elective Cæsarean section in suitable instances under the relative as well as the absolute indication. In private and consulting practice I shall urge the section under similar indication, although I know that, for the present certainly, the advice will rarely be accepted. And why? Because of that fallible test upon which we are all too prone to ultimately rest—statistics.

I have hitherto absolutely ignored the statistical data at my disposal, for the reason that they give no fair estimate of the results obtainable after the elective Cæsarean section. If we take the statistics as collected by Harris, of Philadelphia, we find that the improved Cæsarean operation has saved nearly seventy-six per cent of the women and nearly ninety-four per cent of the children. The fallacy of these data as giving us a clue to the obtainable results from the operation I have pleaded for, is the fact that we do not know in how many of the instances the operation was deliberately elected. If the cases were thus sifted I question if the maternal mortality might not be lowered beyond ten per cent. I so judge from the records of individual operators. There are German operators whose mortality is as low as six per cent; Hertsch has recorded seven cases with no deaths; Cameron, of Glasgow, ten cases with one death; at the New York Maternity Hospital the record for the

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past two years is four cases, all successful both as regards the mothers and children. In the same hospital, during this period, there have been performed four craniotomies with one death, and in another case the shock was so extreme for hours that the patient only rallied after resort to transfusion. On the other hand, the mortality after embryotomy in the European maternities has varied from five and one-half per cent to forty-five per cent, according to the degree of pelvic contraction in the presence of which the operation has been performed. Obviously, the maternal mortality after embryotomy cannot fairly be juxtaposed to that after the elective Cæsarean section, for the very reason that, except in extreme degrees of pelvic contraction, destruction of the living fœtus will always remain, so long as it exists as a justifiable measure, a matter of last resort. The point I desire, however, chiefly to emphasize, is that the statistical data at present at our disposal give us absolutely no omen of the future status of the elective Cæsarean section. If those of us who are connected with maternity hospitals will only, with one accord, cease resorting to embryotomy except in instances where, for one or another reason, the woman's condition does not warrant the section, I have little question but that the results will soon prove that the safety of the mother is not imperilled by the deliberate selection of the alternative operation which avoids mutilation of the child.

DISCUSSION.

Dr. H. J. Garrigues thought we were not justified in viewing the subject entirely from the medical side; we must view it also from the mother's side and that of the relatives. The medical view must to a great extent depend upon statistics. These, in fact, were all that we had to go by. In this country we seldom saw the higher degrees of pelvic deformity, and most gynæcologists and obstetricians necessarily had very little experience on which to base an opinion as to the justifiability of ever performing embryotomy on the living fœtus. They had to look to the experience gained in other countries, especially in

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Germany. All statistics previous to the time of antisepsis might be cast aside as of no practical value. Taking modern statistics, Wyder, of Berlin, had collected two hundred and fifteen cases of craniotomy, with a mortality of between five and six per cent. Caruso's statistics of one hundred and thirty-five cases of Cæsarean section gave a maternal mortality of about twenty-six per cent and an infantile mortality of eight per cent. Leopold, the most successful of modern performers of Cæsarean section, had a maternal mortality of eight per cent, but he had also performed ninety-two craniotomies with no deaths. Taking these statistics into consideration, it could not be denied that Cæsarean section, even with all modern improvements, offered dangers considerably greater than craniotomy—the chances of saving the mother were five times greater by craniotomy than by Cæsarean section, even in the best hands. Laparo-elytrotomy showed a maternal mortality of seven out of fourteen cases since what might be called the tentative period, and a fœtal mortality of forty-three per cent. It must, however, be remembered many of the children were dead before the operation. Symphysiotomy gave a maternal death of about fifty per cent and an infantile mortality of eighteen per cent.* The only other resource was premature labor, and this was the proper thing to do if one saw the case soon enough. The mortality for the mother here was five per cent; for the child, fifty per cent. It seemed to him that the proper course as between the several operations was to choose craniotomy, although there were, of course, exceptions. If there was a generally contracted pelvis it was better, he thought, to perform a Cæsarean section. He also thought we must distinguish between hospital and private practice, city and country practice. Where a full set of instruments and plenty of assistants were at command one would feel less hesitation in undertaking Cæsarean section. The ordinary practitioner would usually find craniotomy easier, although this operation sometimes proved very difficult. From a moral point of view, when it came to a choice between saving the mother and the child he would not hesitate to sacrifice the child. He mentioned the fact that the Roman Catholic Church did not permit of de-

* These statistics have of late been entirely changed. See R. P. Harris, "The Remarkable Results of Antiseptic Symphysiotomy," American Journal of Obstetrics, October, 1892.

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stroying the life of the child. If the physician waited until it died in utero the mother's life would be greatly endangered. In patients of that faith, therefore, we had no choice but to resort to Cæsarean section or symphysiotomy.

DR. R. A. MURRAY said that in this country we seldom found as great deformity or contraction of the pelvis as in European countries, but we had more cases in which the child could not pass through a slightly contracted pelvis because of the large size of the head. The average size of the child at German clinics was six and a half to seven pounds, while here it was seven to seven and a half pounds, which would make considerable difference in the size of the head. We had, then, to judge each case by itself, since the question of whether the child could be delivered through the pelvic canal depended not alone upon the size of that canal, but also upon the size of the head. When the child was dead it became a question of only absolute indication. If there were sepsis in the womb, he thought it would be better to perform Cæsarean section; if the organ were actually contaminated, do hysterectomy. Embryotomy had little advantage over Cæsarean section in ease of performance. Although Leopold had had some deaths from Cæsarean section and none in embryotomy, yet the saving of child-life in the former should have some weight. He favored elective Cæsarean section, especially in hospital practice. Prior to the days of antisepsis the statistics showed that most of the successful cases of Cæsarean section in this country had occurred in country practice.

DR. H. C. COE said that he had been called in consultation in a private case of contracted pelvis recently which illustrated the difficulty of carrying out a preconceived theory. Labor had been in progress for thirty-six hours, the membranes had ruptured twenty-four hours before, the head had not engaged, the child (of large size) was alive, and the mother in good condition. Attempts to deliver with forceps had failed. The question of Cæsarean section was raised. The husband left it with Dr. Coe to decide, but the other physicians opposed it, favoring embryotomy. They asked him, if the woman were his wife, would he have Cæsarean section performed? He answered frankly that he would not. He then tried version, but did not succeed. The child had meantime died, and he performed embryotomy. The operation was dif-

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ficult; the mother's chances would probably have been as good under Cæsarean section. She recovered. Had the case been in hospital instead of private practice, Cæsarean section would undoubtedly have been elected.

One of the chief difficulties in deciding what course to pursue was that many patients in whose case we expected to be obliged to resort to Cæsarean section or embryotomy were actually delivered spontaneously or with forceps. The statistics of craniotomy in this country could not be compared with those in Europe, for here physicians frequently overlooked slight contractions, and prolonged attempts were made at extraction before embryotomy was resorted to, and the last operation added too much to existing shock for the patient to rally. He thought that it was a mistake to try to lay down positive rules for the performance of Cæsarean section or craniotomy based upon the pelvic diameters alone, leaving out of consideration the size of the fœtal head. Personally, he favored elective Cæsarean section in hospital practice, but it seemed a question whether it would in this country ever be adopted in private practice.

DR. W. T. LUSK said he could hardly express his own views better than Dr. Garrigues had done. Success with Cæsarean section had not come to that point where we could say to our patients conscientiously that "this operation has its dangers, and embryotomy has its dangers, and they are so nearly equal that we would advise you to choose the former, whereby you will not only stand as good a chance of life yourself, but you will have a living child."

It was not true that Cæsarean section was attended with as little danger as craniotomy; it was an error to convey that impression to the profession at large. Of course, in large hospitals where the organization was perfect, some marvellous results had been obtained from Cæsarean section, but in the same hospitals there had been no mortality from embryotomy. As to his own experience with Cæsarean section, his first patient recovered easily and he felt much encouraged; his second patient, although she had been in labor six days, recovered after a protracted illness, and so, too, with his third patient; but the fourth patient died, the cause of death being obstruction of the bowel due to the formation of a psoas abscess which filled all the vacant space in the pelvic cavity. Another patient died, though in good condi-

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tion for three days after the operation. The autopsy revealed nothing. Both the fatal cases were kyphotic. He thought we would do well to get eighty per cent of recoveries from Cæsarean section, whereas after ordinary laparotomies we could expect ninety-five per cent of recoveries. Cæsarean section required more skilled assistants than craniotomy. Under these circumstances we could hardly go to families and enforce a rule to carry out Cæsarean section.

DR. GARRIGUES said, with regard to the statement that children here weighed at birth seven to seven and a half pounds, while German statistics gave their weight as six and a half to seven pounds, would make them out of about equal weight, for we had to add about one-seventh to the German pound to convert it into the English equivalent. He had found, on weighing a number of children born here of immigrants, that their weight was about that of children of American parentage.

DR. C. JEWETT sent a communication which was read by Dr. Grandin. He said he would perform embryotomy on the living fœtus because the safer operation under certain rare emergencies, such as the necessity for rapid termination of labor in the interests of the mother; where the mother was exhausted or otherwise rendered unable to undergo an abdominal operation; where the conditions were not favorable for the child subsequently. In choosing between the two operations, account must be taken of the skill of the operator. The general practitioner unaccustomed to laparotomy had better undertake embryotomy.

DR. E. H. GRANDIN said that statistics showing a mortality of twenty-five per cent were sufficient to condemn Cæsarean section, but it must be remembered that in the majority of the cases recorded the operation was not elective—it was resorted to only after the mother had been submitted to shock and exhaustion from attempts at version, etc. He simply contended as yet for elective Cæsarean section in hospital practice. He thought that under circumstances of hospital practice it would soon show a mortality as low as ten, perhaps as low as five, per cent. As to the relative difficulty of Cæsarean section and embryotomy, he had found the former very easy, while the latter in his slight experience had often proved very difficult. Then the chances of lacerations, septic poison-

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ing, and even serious injuries as such, were marked in embryotomy. The point on which the discussion hinged was this: Either let us deliberately elect embryotomy or else elect the Cæsarean section. To resort to the latter measure after all other methods of delivery, short of embryotomy, had failed, could not result otherwise than in a bad record against the section. To perform the section advisedly—even as an ovariotomy, for example—*ought* to subject the woman to but one risk, and this was surgical shock.

DR. C. A. VON RAMDOHR, who arrived late, asked permission to reopen the discussion, and read the following:

1. Embryotomy of the living fœtus is justifiable, and its justifiability will hardly be disputed by any obstetrician, if the fœtus be (*a*) a hydrocephalic infant; (*b*) the head be engaged in a malposition (face mento-posterior; large head, occipito-posterior); (*c*) the labor be of long duration, with either a suffering mother (pulse or temperature) or a weak child (difference of thirty beats during observation), where an attempt with forceps has proved in vain; (*d*) if after version the disproportion of fœtal head and maternal pelvis prove too great.

2. This discussion will, however—as four of the six announced speakers of the evening are connected with the Maternity Hospital, and are avowedly in favor of a relative indication of Cæsarean section—hinge on its justifiability, and here a different indication ought to be established between expert obstetricians and general practitioners.

(1) While a relative indication is permittedly justifiable, and may be imperative to the obstetric surgeon who can choose his time, his assistants, and has got all the appliances of a well-regulated hospital plus his laparotomy experience at his disposal,

(2) It ought to be declared malpractice for a general practitioner, unless furnished with all the requisites similar to the above, to put a relative indication for Cæsarean section as long as embryotomy is practically without danger to the mother, while Cæsarean section still represents a mortality of more than seven per cent, and as long as the fathers of modern Cæsarean section—Leopold and Sänger—have not agreed on the relative indication.

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Stated Meeting, May 7th, 1891.

OBSERVATIONS ON THE USE OF KOCH'S TUBERCULIN IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

Observations in St. Luke's Hospital.

Dr. F. P. Kinnicutt opened the discussion with a report of the results of treatment with tuberculin in cases of pulmonary and laryngeal tuberculosis in St. Luke's Hospital up to the present date. Forty-two patients suffering from various forms of tuberculous disease had been inoculated under his personal supervision since December 10th. Of these, thirteen were cases of pulmonary tuberculosis, in six of which evidence of a tuberculous affection of the larynx also existed. The cases were divided into groups, viz.: 1. Cases in which notable improvement had occurred both in the pulmonary and general condition. 2. Cases in which either no improvement had occurred, or improvement in certain respects had been observed and not in others. 3. Cases in which either distinct deterioration in the condition of the patient or progress of the disease accompanied the inoculations. The cases were described in detail, and diagrams were exhibited showing the changes in the laryngeal lesions, and also indicating numerically the number of bacilli found in the sputum in successive examinations during the period of treatment.

Five cases were included in the first group, all presenting on admission the physical signs of the first stage of pulmonary tuberculosis. Three of the patients had been discharged from hospital with cough and sputum practically absent, as well as bacilli. The improvement in the general condition and weight, and in the physical condition of the lung, was notable in all. Two patients still remained in hospital under treatment. In these a similar improvement had occurred.

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The second and third groups each embraced four cases. In one of the cases in the second group the laryngeal lesion had shown distinct improvement; in one the disease, similarly located, had progressed.

In the third group a striking example was given of the rapid development of a massive hepatization (catarrhal or caseous), followed by excavation, during and following the period of inoculations. The physical signs on admission, in this case, were those of the first stage of the disease. In a second case in this group cardiac and renal disease was present before inoculation, and the discontinuance of the treatment was necessitated on account of these complications.

A few of the impressions which Dr. Kinnicutt had received from an experience of nearly five months in the treatment of various forms of tuberculosis with Koch's fluid were summarized as follows:

General Impressions.—Tuberculin may be regarded as possessing marked elective affinities for tuberculous tissue. Its value in differential diagnosis must be considered as relative rather than positive. Doses of minimum strength, gradually increased and given at longer intervals than was originally advised, constitute the safest and probably the most efficient method of its use.

Impressions of its Effects in the Treatment of Pulmonary Tuberculosis.—Beneficial effects from the use of tuberculin are apparently restricted to pulmonary disease in its early stages. In such forms of tuberculosis the most careful study of the individual, of the history and physical signs of disease previous to inoculation, does not permit an opinion of the probable nature or degree of reactions, or of the ultimate effect of treatment in any given case. The establishment of constitutional tolerance varies greatly in time in different individuals suffering from apparently similar lesions, and cannot be accepted as a basis for prognosis. Local reactions may continue to be developed, under treatment, in the entire absence of constitutional effects as indicated by the temperature curve. Tuberculin is apparently capable in certain exceptional cases, even of incipient disease, of exciting pneumonic processes (catarrhal and caseous hepatization) of varying degrees of intensity. Whether such processes are due to the conveyance into other parts of the lung of material affected by the fluid or by liberated bacilli, or are excited in some other manner, is uncertain.

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The production of hæmoptysis by tuberculin is comparatively rare. Its use necessitates the greatest watchfulness and entails much anxiety on the part of the physician.

In conclusion, it is my distinct impression that tuberculin is capable, in the early stage of pulmonary tuberculosis, of effecting a greater degree of improvement in the physical condition of the lung, and, in more advanced disease, in many of the accompanying symptoms, than has been observed under any other method of purely medical treatment. Its sphere of greatest usefulness will probably be found in its combination with other methods of treatment.

The above impressions must be regarded as liable to modification with continued and more extended clinical study. They find expression only after the first enthusiasm excited by Koch's discovery has passed away, and are the impartial outcome of daily and laborious observations extending over a period of several months.

Observations in Bellevue Hospital.

By ALFRED L. LOOMIS, M.D., LL.D.,

NEW YORK CITY.

I DESIRE to present a tabulated statement, with brief histories, of thirteen cases of pulmonary tuberculosis treated with Koch's tuberculin in Bellevue Hospital from December 18th, 1890, to March 11th, 1891, with conclusions which I have reached from such experience. The table and the accompanying abstracts of the histories have been taken from the record books of the University Division of the hospital by Dr. C. E. Knight, senior assistant of the division.

The inoculations in the cases reported were made by Drs. H. S. Stearns and H. P. Loomis.

The sputum examinations were made by Drs. J. M. Byron and E. Le Fevre.

Of these thirteen cases seven were in the first stage (or stage of consolidation without softening), two were in the second stage (or stage of consolidation with softening)

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and four in the third stage (or stage of softening with excavation).

Of those included in the *first class* the maximum age was thirty-five years, the minimum twenty-two, the average age twenty-eight. The average duration of disease at the time of beginning of treatment was thirteen and a half months. The largest number of injections given to any case in this class was seventy-seven; the average amount of each injection was 0.0019 gramme.

At the end of the treatment the general condition of each of these cases was improved. All gained in weight; the greatest gain was fourteen and a half pounds, the least three and a half pounds, and the average gain was eight and a half pounds. In four cases the cough and expectoration almost entirely disappeared and the night sweats ceased. In all but two the examination of the sputum showed a diminution in the number of bacilli to the field.

In every one of these cases the physical signs indicated that, for a period varying from four to twelve days after the first injection, the activity of the pathological processes in the affected pulmonary areas was markedly increased. This activity after the second week gradually subsided, and by the end of the third week all signs of activity in the phthisical process had ceased and the diseased areas gave the usual evidence of arrested phthisis. In three cases, at the last examination, the change in the physical signs varied but little from those noted at the first examination before the beginning of treatment. In two cases vesicular breathing was heard over the diseased area. In two the signs of consolidation had increased, and the râles were more numerous than at the first examination.

In one case, at the last examination the physical signs of cavity were present, where bronchial breathing only was heard at the time of the commencement of the treatment.

Of the two cases included in the *second class*, one died, thirty-six days after the beginning of the treatment, of

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disseminated tuberculosis (tubercles being found at the autopsy in all the organs of the body).

The other case gained four and a half pounds in weight, his strength improved and his night sweats became less frequent, his expectoration more abundant, and the number of the bacilli increased. The physical examination of his chest, four weeks after treatment was stopped, indicated the existence of a large cavity in the pulmonary area, the original seat of the tubercular infiltration.

Of the four cases included in the *third class* the average age was thirty-five years. The average duration of the disease at the time of the beginning of the treatment was four months and two weeks. The average duration of treatment was eleven weeks.

The greatest number of injections given to any one case in this class was seventy-four, the least number forty-six; the average amount of each injection was 0.0007 gramme.

One case died, during the sixth week of treatment, with extensive pulmonary infiltration, softening, and cavity. The greatest gain in weight in any one in this class was fifteen and three-quarter pounds, the least six pounds, the average gain nine pounds. In all but one of this class the cough and amount of daily expectoration were not appreciably changed. In one they diminished. In one the night sweats ceased. In all, the activity of the pathological processes, as indicated by the physical signs, markedly increased after the second injection. The comparison of the physical signs before and after treatment shows that in two cases the moist sounds had disappeared and the cavities had become dry, indicating the arrest of the phthisical processes. In the other case the physical signs showed an extension of the disease. In none of this class was there any appreciable change in the number of the bacilli. One case was under treatment only eleven days and left the hospital; no bacilli were found in his sputum.

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From my observations of these cases and others in private practice I am forced to the following conclusions:

1. That we have in Koch's tuberculin an agent which excites active changes in tubercular areas, as indicated by the changes in the physical signs; that the nature and extent of these changes vary with the amount of the fluid injected and the frequency with which the injections are repeated; that if large quantities are given, sufficient to produce marked reactions where large tubercular areas exist, rapid extension of the disease occurs, followed by softening and the signs of acute phthisis.

2. If small injections, varying from one-tenth to one milligramme, are used at long intervals, while no fever of reaction is produced, though activity in the tubercular areas, as indicated by changes in the physical signs, may follow each injection, it soon subsides (no injection should be given until the reacting fever has subsided), the activity in the tubercular processes is in most instances arrested, and, if the nutrition of the patient is fully maintained by an abundance of easily digested and nutritious food and by good hygienic conditions, the usual evidences of arrested phthisis are soon reached.

I am convinced that there is no method which so effectually maintains the nutritive processes in the pulmonary tissue during the use of the tuberculin as the pneumatic cabinet, used according to the plan proposed by Dr. C. E. Quimby.

3. While the number of bacilli in the sputum was slightly diminished in most of the cases treated, in no case did they entirely disappear, and it seems evident that the number of bacilli in the sputum cannot be taken as a reliable indication of the effects of the tuberculin on the phthisical processes; nor do I believe that it is necessary that they shall entirely disappear from the sputum of phthisical subjects in order that they may be classed as cured, for in those cases of phthisis which have been under my observation where recovery has taken place under climatic and hygienic influences after all active signs of

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the disease have been absent for a long period—in one case as long as ten years, the individual being apparently in perfect health—bacilli have been found in the expectoration.

4. While in the majority of our cases an arrest of the tubercular processes has followed the use of the tuberculin, sufficient time has not elapsed to venture an opinion as to the permanence of such arrest.

5. In a minority of our cases the use of the tuberculin has been followed by great activity in the original tubercular areas and a rapid development of new areas. In two instances its use was followed by signs of acute general tubercular infection, which rapidly precipitated a fatal issue.

In conclusion, I venture to state that a longer and more careful experience is required for the proper and safe use of this agent than for that of any other therapeutic agent which has been given to the profession; that while the expectations of Prof. Koch may not be fully realized, I believe that after this agent has passed through the siftings of careful and experienced clinicians it will take a permanent place among the aids for the cure of pulmonary tuberculosis.

Abstract of Cases Treated.

CASE I.—Mary Davids, age twenty-two, admitted December 18th, 1890. No family history of tuberculosis. Cough began one year ago. Temperature from 99° to 102°. Has occasional night sweats.

Physical Signs.—Left apex, behind, feeble inspiration; in front, inspiration accompanied by fine râles. Right apex, behind, slight tubular expiration; in front, normal vesicular breathing. Weight, one hundred and twenty-eight and a half pounds. Sputum, twenty-five to fifty bacilli to the field.

Fourth day of treatment. In front at left apex respiration slightly bronchial. Râles larger and more abundant.

Eleventh day. Bronchial breathing at both apices be-

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hind. Examination of sputum, three to eight bacilli to the field.

End of treatment. No bronchial breathing at the right apex behind or in front; no râles. Left apex, slight bronchial breathing and sharp râles on coughing behind; no bronchial breathing or râles in front. Patient coughs and expectorates very little, is much stronger, temperature normal, has no night sweats. Weight, one hundred and thirty-two pounds, a gain of three and a half pounds. Sputum, five to eight bacilli to the field.

Number of injections, fifty-five. Average amount, 0.001 gramme.

Under treatment eleven weeks.

CASE II.—John Dyer, age thirty, admitted December 17th, 1890. Mother died of phthisis. Cough began one year ago. One month ago had profuse hæmoptysis. He is weak and unable to work. Temperature rises to 103° in evening.

Physical Signs.—Feeble inspiration, expiration broncho-vesicular, and fine, crackling râles at the end of expiration in the infraclavicular region of the right side. Weight, one hundred and thirty-one pounds. Examination of sputum, forty to fifty bacilli to the field.

Fourth day of treatment. After the second injection the râles in right infraclavicular region are much more numerous and are now for the first time heard behind. Examination of sputum, fifty to one hundred bacilli to the field. Patient has profuse sweats.

Eighth day. All râles behind have disappeared, but there is bronchial expiration at the right apex. Number of bacilli, fifty to one hundred to the field.

At end of treatment. Patient's general condition improved; he is stronger, has little cough, and no temperature or night sweats. Weight, one hundred and forty-two and a half pounds, a gain of eleven and a half pounds. Sputum, fifteen to twenty bacilli to the field. Very little change in the physical signs since the last examination.

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Total number of injections, forty-seven. Average amount, 0.001 gramme.

Under treatment ten weeks.

Six weeks after treatment. Distinct improvement in general condition. Coughs and expectorates little. He looks well, works every day, and says that he feels as well as ever. Weight, one hundred and forty-three and a half pounds.

Physical Signs.—Feeble respiration and a few fine, crepitating sounds on coughing in infraclavicular region of right side. No other signs of disease.

CASE III.—Joseph Quinn, age twenty-nine, admitted December 18th, 1890. Brother and sister died of phthisis. Cough began three years ago. First hæmorrhage one year ago. Has lost flesh rapidly, has fever and night sweats, is weak, and suffers from dyspnœa.

Physical Signs.—No vesicular breathing; bronchial expiration at left apex. Inspiration accompanied by fine râles. Evidences of an old pleurisy over lower part of left lung. Weight, one hundred and eighteen pounds. Examination of sputum, fifteen to twenty bacilli to the field.

Third day of treatment. After second injection evidence of consolidation extending over the whole of the left lung, with abundant moist râles at the apex.

Seventh day. Râles less numerous.

End of treatment. Coughs and expectorates very little; has occasional night sweats. Weight, one hundred and thirty-two and a half pounds, a gain of fourteen and a half pounds. Examination of sputum, eight to ten bacilli to the field.

Physical Signs.—Broncho-vesicular breathing at the left apex. Pleuritic friction over lower portion of lung.

Number of injections, twenty-three. Average amount, 0.005 gramme.

Under treatment eleven weeks.

Five weeks after end of treatment. Looks well, coughs and expectorates very little, has some pain in left side.

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When he entered the hospital he was unable to work, but is now doing hard work every day. Weight, one hundred and twenty-five and a half pounds, a loss of seven pounds since he left the hospital.

Physical Signs.—Feeble inspiration over the entire left side. At left apex no bronchial breathing.

CASE IV.—Albert Funk, age twenty-four, admitted December 17th, 1890. Father, brother, and two sisters died of phthisis. Cough began one year ago. Has fever and night sweats; is weak and unable to work.

Physical Signs.—Dulness at both apices. Left apex, in front, broncho-vesicular respiration and mucous râles. Right apex, rude respiration. Behind, left apex, high-pitched breathing and mucous râles. Weight, one hundred and twenty pounds. Sputum, three bacilli to the field.

Fourth day of treatment. *Physical Signs.*—Bronchial breathing and many moist râles at both apices behind; large mucous râles on left side anteriorly.

Sixth day. Expectorated two mouthfuls of blood.

Physical Signs.—Râles have disappeared on the right side behind. Few râles in front; left side same as at previous examination. Examination of sputum, twenty-five bacilli to the field.

Thirty-third day. Behind, râles on the left side, vesicular murmur more distinct.

Thirty-ninth day. Behind, left side, no râles and no evidence at consolidation at apex. On the right side respiration dry and blowing.

End of treatment. *Physical Signs.*—Few dry inspirations in front on the left side. Behind, broncho-vesicular respiration at left apex. Weight, one hundred and twenty-seven pounds, a gain of seven pounds. Cough and expectoration diminished; has occasional night sweats. Sputum, four to six bacilli to the field.

Three weeks after treatment. Weight, one hundred and twenty-four pounds. General condition about the same as at the end of treatment.

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Physical Signs.—Broncho-vesicular breathing and mucous râles in front at left apex. Behind, at right apex, hollow tubular breathing and a few respiratory râles.

Under treatment thirteen weeks.

Number of injections, seventy-seven. Average amount, 0.001 gramme.

CASE V.—John Owens, age thirty-two, admitted December 15th, 1890. Family history good. Cough began three months ago. Consolidation at both apices, but no râles. Weight, one hundred and seventeen and a half pounds. Sputum, one to two bacilli to the field.

December 26th, third day of treatment. Abundance of râles at the right apex.

End of treatment. Cough has almost disappeared. There has been no sputum during the last week, therefore cannot make an examination of sputum. Weight, one hundred and twenty-one and a half pounds, a gain of four pounds.

Physical Signs.—No change since the last examination.

Number of injections, six. Average amount, 0.003 gramme.

Under treatment eleven days.

CASE VI.—Thomas Temple, age thirty-five, admitted September 18th, 1890. No family history of tuberculosis. Cough began six months ago. Temperature from 99° to 100°.

Physical Signs.—Left side, in front, prolonged expiration. Right, rude respiration. Left, behind, tubular breathing in scapular region. Right, tubular expiration, but not so marked as on the left. Weight, one hundred and twenty-seven pounds. Sputum, fifty bacilli to the field.

Fourth day of treatment. Bronchial breathing at both apices behind.

Twelfth day. Behind, at right apex, bronchial breathing, resembling amphoric, but no amphoric whisper. Left side, râles. Sputum, forty to forty-five bacilli to the field. Weight, one hundred and twenty-six pounds.

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End of treatment. Last examination. Bronchial breathing at both apices, with a few sticky râles on the left on coughing. Weight, one hundred and thirty-two pounds. Sputum, one hundred bacilli to the field. Cough diminished, no night sweats, and feels much stronger than when he came to the hospital.

Under treatment ten weeks.

Number of injections, sixty-three. Average amount, one-half to one milligramme.

Four weeks after treatment. Has had several hæmorrhages since treatment stopped, and does not feel so well. Weight, one hundred and twenty-six and three-quarter pounds.

Physical Signs.—In front, dry tubular breathing on both sides. Behind, left apex, dry cavernous (?) breathing.

CASE VII.—Edward Atwood, age thirty-three, admitted December 29th. Mother died of phthisis. Cough began one month ago. Three weeks ago had slight hæmorrhage. During the last two months he says that he has lost forty pounds. Temperature, 99° to 103 . His throat is tender and swollen. He cannot speak above a whisper. Weight, one hundred and four and a half pounds. Sputum, three to eight bacilli to the field.

Physical Signs.—In front, at left apex, well-marked broncho-vesicular breathing, with abundance of mucous râles at the right apex; exaggerated rude respiration. Behind, spot of softening at the left apex; (?) bronchial respiration; large and small mucous râles. On right, bronchial expiration and some very fine râles heard on coughing.

Twelfth day of treatment. Physical signs unchanged. Bacilli, eight to ten to the field. Weight, one hundred and four pounds.

Eighteenth day. Moist râles less numerous and signs of softening disappearing.

End of treatment. In front, on left side, broncho-vesicular breathing with crackling râles. Behind, some evidences of softening. Left side unchanged. Weight, one hundred and nine pounds.

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Number of injections, forty-eight. Average amount, 0.001 gramme.

Under treatment ten weeks.

No improvement in voice; otherwise marked improvement.

Four weeks after treatment. Has no pain in chest, few night sweats, cough has diminished. When he came to the hospital he was unable to do any work, but can now do any light work, and work all day. No improvement in voice. Weight, one hundred and eight pounds.

Physical Signs.—Left apex, behind, some vesicular breathing. Right, behind, blowing tubular expiration; numerous râles on coughing. In front, on right, gurgles. Left side, in front, no vesicular breathing; abundance of râles and pleuritic crepitations.

SECOND STAGE. CASE VIII.—Martin Dowling, age thirty-eight, admitted December 23d, 1891. Family history good. Cough began six weeks ago. Infiltration upper third of both lungs, abundance of liquid râles, hot, constant pains, and night sweats. Weight, one hundred and forty-one and a half pounds. Sputum, forty to fifty bacilli to the field.

Fifth day of treatment. Râles less liquid, and bubbling; bacilli twenty to thirty to the field.

Twenty-eighth day. Râles are more numerous. Signs of softening at the left apex.

Twenty-ninth day. Had hæmorrhage, expectorated blood. Signs of infiltration throughout both lungs. Pulse feeble and irregular. Weight, one hundred and thirty-six pounds. Injections stopped.

Thirty-sixth day. Died.

Number of injections, twenty-four. Amount, from a quarter to a half milligramme. Last injection ten days before death.

Autopsy.—Tubercles were found in the lungs, brain, liver, right kidney, spleen, retroperitoneal glands; and in the intestines tubercular ulcers. For more complete

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report of autopsy see article by Henry S. Stearns (*Medical Journal*, March 7th, 1891).

THIRD STAGE. CASE IX.—Maggie Brown, age twenty-seven, admitted December 8th, 1890. Cough began five weeks ago. Has lost considerable flesh. Has fever, night sweats, but little cough.

Physical Signs.—Consolidation at both apices. Sharp, high-pitched râles like small gurgles at inner angle of scapula of right side. Weight, seventy-nine pounds. Sputum, ten to fifteen bacilli to the field.

Fourth day of treatment. Consolidation at the left apex more evident, and râles are more numerous. Right side is unchanged.

Sixth day. Consolidation on left side extending downward.

Eighth day. Râles on the right side less numerous.

End of treatment. General condition improved; is stronger, and says she feels very much better. Weight, ninety-four and three-quarter pounds. Sputum, fifteen to twenty bacilli to the field. Râles less liquid, vesicular sounds more distinct.

Number of injections, seventy-four. Average amount, 0.0005 gramme.

Under treatment thirteen weeks.

Three weeks after treatment. Feels stronger. Cough and expectoration have diminished. Weight, ninety-six pounds—a gain of one and a quarter pounds since the end of treatment.

Physical Signs.—Right side, behind, amphoric breathing. No gurgles left side. At apex, tubular breathing, and fine râles on coughing.

CASE X.—Louisa Emmons, age forty, admitted January 20th, 1891. Family history negative. Cough began about one year ago. She has lost a good deal of flesh, has fevers, night sweats, and suffers from pain in the infrascapular region of the left side. Weight, one hundred and twenty-six pounds. Examination of sputum, five to eight bacilli to the field.

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Physical Signs.—Evidences of small cavity at right apex. Pleuritic crepitations over anterior surface of right lung. Left lung normal.

Thirty-seventh day of treatment. Some increase in the number of râles, otherwise no change. Sputum, thirty to forty bacilli to the field. Weight, one hundred and thirty-two and a half pounds.

Under treatment eight weeks.

Number of injections, forty-six.

End of treatment. Physical signs unchanged. Weight, one hundred and thirty-two pounds.

Four weeks after treatment. Weight, one hundred and twenty-seven pounds. Better than when she came to the hospital.

Physical Signs.—In front, on right side, amphoric breathing; gurgles on coughing.

CASE XI.—George Guiles, age nineteen, admitted December 21st, 1890. Father and one brother died of phthisis. Cough began three months ago, since which time he has lost fifteen pounds. Has night sweats; is thin, anæmic, and badly nourished. Weight, one hundred and four and a half pounds. Examination of sputum, five to ten bacilli to the field.

Physical Signs.—Right side, behind, bronchial breathing, and large and small mucous râles on coughing in suprascapular and scapular regions. Left side, high-pitched expiration at the inner border of scapula; no râles.

Second day of treatment. Signs of cavity at right apex, râles, and fine gurgles. Râles with tubular expiration at left apex.

Eighth day. Râles less numerous; other signs unchanged since last examination.

Thirty-sixth day. Dry, cavernous breathing on right sight behind; other signs unchanged.

End of treatment. No change in cough or number of bacilli. Night sweats have ceased. Weight, one hundred and ten and a half pounds.

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Number of injections, sixty. Average amount, 0.0005 gramme.

Under treatment twelve weeks.

Four weeks after treatment. Weight, one hundred and twelve pounds. Cough and expectoration unchanged. Is stronger and appears very much better.

Physical Signs.—Right side, behind, dry, cavernous breathing; gurgles on coughing. Left apex, bronchial expiration.

CASE XII.—Christopher Darcy, age forty-seven, admitted December 10th, 1890. Family history negative. Slight hæmorrhage three months ago. Cough began two weeks ago. Suffers from dyspnœa. Fever and night sweats.

Physical Signs.—Consolidation at both apices. Mucous râles on left side anteriorly. Weight, one hundred and thirteen pounds. Sputum, one bacillus to the field.

Fourth day of treatment. Râles resembling gurgles at inner angle of scapula on right side.

Sixth day. No râles on the right side behind. In front, râles quite numerous. Sputum, one to three bacilli to the field. Weight, one hundred and fifteen pounds.

Tenth day. Evidences of cavity at left apex. Weight, one hundred and eighteen pounds.

Sixteenth day. Treatment stopped.

Patient continued to gain in weight up to the fifty-eighth day, when he weighed one hundred and twenty-one and a half pounds. He then began to fail, and died eighty-four days after treatment began.

Post-mortem Examination.—Miliary tubercles over the surface of both lungs. Several cavities on the posterior surface of the right. Tubercles scattered throughout left lung.

Left lung, several small cavities, with tubercular infiltration of entire lung. Heart and spleen normal. Liver, perihepatitis. Intestines, eight small tubercular ulcers. Brain not opened.

CASE XIII.—John Lacy, age forty-five, admitted No-

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TABULATED STATEMENT OF CASES TREATED.

Name.	Age.	Duration of disease.	Stage of disease.	Gain in weight during treatment.	No. bacilli at beginning.	No. bacilli at end.	Change in cough at end.	Night sweats at beginning.	Night sweats at end.	Change in the general condition.	No. weeks under treatment.	No. injections.	Average amount of injections.	Remarks.
Mary Davids.....	22	12 mos.	1st	3½	25–50	5–8	Diminished.	Yes.	No.	Improved	11	55	.001 grm.	The activity of the process in the lungs increased up to the eleventh day. They then diminished slightly to the end of treatment.
John Dyer.....	30	12 "	"	11½	40–50	15–20	No change.	"	"	"	10	47	.001 "	Active process increased to the sixth day and then diminished.
Joseph Quinn.....	29	36 "	"	14½	15–20	8–10	Diminished.	"	Occasional.	"	11	23	.005 "	Active process increased to the 4th day and then diminished steadily to the end
Albert Funk.....	24	12 "	"	7	3	4–6	"	"	"	"	13	77	.001 "	Active process increased for a few days. At end of treatment the lungs in about the same condition as at the beginning.
Thomas Temple..	35	6 "	"	5	50	100	"	"	"	"	10	63	.00075 "	Active process increased slightly to the 12th day and then remained unchanged for two weeks, and then diminished.
John Owens.....	32	3 "	"	4	1–2	0	"	"	Yes.	"	11 days.	6	.008 "	Active process increased.
Martin Dowling. ..	38	6 w'ks.	2d	—5½	40–50	40–50	No change.	....	....	Died.	4	24	.0007 "	Active process diminished first and then increased.
Edward Atwood...	33	1 mo.	"	4½	3–8	8–10	"	Yes.	Less freq't.	Improved	10	48	.001 "	Changes very variable, rales sometimes diminishing and sometimes increasing. Four weeks after treatment evidences of cavity.
Maggie Brown.....	27	5 w'ks.	3d	15¾	10–15	10–20	Diminished.	"	Yes.	"	13	74	.0005 "	Active processes increased to third day. Diminished afterward.
Louisa Emmons...	40	12 mos.	"	6	5–8	30–40	No change.	"	"	"	8	46	.00075 "	Very little change until third week, and then diminished.
George Guiles.....	19	3 "	"	6	5–10	5–10	"	"	No.	"	12	60	.0005 "	Active process increased for five days and then diminished.
Christopher Darcy.	47	3 "	"	..	1	10–15	Increased	No.	"	Died.	12	63	.001 "	Process increased for a few days and then seemed to diminish a little. On the seventieth day increased again.
John Lacy	45	12 "	"	1½	0	0	No change.	Yes.	"	Slightly improv.	10 days.	6	.004 "	Very little change.

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vember 1st, 1890. Treatment began December 19th, 1890. Family history negative. Cough began one year ago.

Physical Signs.—Bronchial breathing and evidences of cavity at right apex. No fever or night sweats. Weight, one hundred and thirty-five pounds. Sputum, no bacilli.

Fourth day of treatment. Respiration amphoric. Distinct amphoric whisper. Sputum, no bacilli.

Sixth day. No change.

End of treatment. No change in physical signs or sputum. Weight, one hundred and thirty-six and a half pounds.

Number of injections, six. Average amount, 0.004 gramme.

Under treatment ten days.

The improvement under lymph treatment was no greater than before.

Observations in Mount Sinai Hospital.

Dr. H. N. Heineman spoke of the observations which he had made in the Mount Sinai Hospital on twenty-two cases of pulmonary phthisis. Fifteen of these were in the second stage, and four presented cavities. Of the latter, one was markedly improved, one slightly, and two were not benefited by the treatment. In one case, giving a history of twenty-five years of cough, and presenting the physical signs of a chronic fibroid phthisis, after the treatment had been discontinued for several weeks the patient had for the first time a pulmonary hæmorrhage, and these were repeated several times in the course of the next few weeks. In two other cases hæmorrhages were brought on by small injections of the tuberculin. In the case referred to the patient presented himself with consolidation at the left apex and a slight encapsulated pleurisy. During the treatment the pleurisy disappeared, leaving a solidified lung, but there was gradually developed over the entire left side a tuberculous process, which finally extended over the right side, notwithstanding that only small doses of tuberculin were employed. A continuance of the treatment, however, resulted in a partial subsidence of these symptoms, and the patient was ultimately dis-

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charged, decidedly improved in his general condition. In another case, having cavities and a small tuberculous testicle, the tuberculous process in the testicle became so active that four weeks later it was deemed necessary to resort to castration, and after the removal of the testicle scattered tubercles were found all through it. He did not think the number of bacilli was of much importance in determining the amount of improvement. He wished to call particular attention to the fact that the presence of any kidney or cardiac disease was a positive contra-indication to the use of tuberculin, for the albumin was always increased by such treatment, and in one fatal case he felt sure that the tuberculin was responsible for the development of a parenchymatous nephritis.

Observations in Adirondack Cottage Hospital.

By E. L. TRUDEAU, M.D.

I WOULD present to the consideration of the Academy the results thus far obtained in the first eight cases treated since January at the Adirondack Cottage Sanitarium by injections of tuberculin combined with all other climatic, hygienic, and therapeutic measures which experience has shown capable of favorably influencing the course of pulmonary phthisis, and even, in some instances, of curing the disease.

The measures referred to consisted of a residence in the invigorating climate of the Adirondacks; a systematic, restful out-of-door life, eight to ten hours being spent daily in short walks or sitting on sheltered verandas out-of-doors irrespective of temperature or weather; dry friction to the skin; careful feeding, milk entering largely as an element in the diet; the administration of creosote in doses varying from ten to eighteen drops daily, according to the state of the patient's digestive powers—this being, with slight variations, the usual treatment resorted to in the institution. In addition, in six of the cases, lung expansion in the pneumatic cabinet, with daily inhalations of peroxide of hydrogen according to the plan suggested by Dr. Quimby, were given with a view

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of producing favorable influence on both the capillary and lymphatic pulmonary circulation.

The injections of tuberculin were made generally twice a week, the dose being so regulated as to produce as slight a reaction as possible. In cases where the reactions became marked or the patient's nutritive powers showed any sign of depreciation, the intervals between the injections were lengthened and the doses diminished. The amount injected was, however, very slowly but steadily increased until doses of from eighteen to a hundred milligrammes were given without any appreciable disturbance.

These eight patients were treated for about four months. Four were incipient and apyretic cases, and four were more advanced and showed a daily rise of temperature. In two of these the diagnosis of incipient laryngeal tuberculosis had been made by competent observers. All had expectoration with bacilli. The results for the apyretic cases: one apparently cured, two greatly improved, one unimproved; for the four feverish cases: two greatly improved, one unimproved, one lost ground rapidly.

The case which is classed as apparently cured presented before treatment a slight lesion at both apices; had had several attacks of hæmoptysis and morning expectoration with bacilli, and had rapidly improved under climatic treatment. At present the patient has gained thirty pounds and has no symptoms whatever referable to the lungs, the expectoration, which only occurs at intervals of several days, being in vain searched for bacilli.

The four greatly improved gained from four to twenty pounds, and lost all the rational signs of their disease save slight morning expectoration, which, however, still was found to contain bacilli. Two cases showed no improvement, and one patient—a young woman who presented evidence of miliary tubercles of both apices, with a slight daily afternoon fever—became very rapidly worse from the time the injections were first given. The smallest doses of tuberculin produced in this patient a most violent and long-continued constitutional reaction, the tempera-

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ture on one occasion reaching 104.5°, and the pulse 160, with panting respiration. The hectic gradually increased in duration until the fever became almost continuous and the treatment was abandoned.

The gross results are therefore for eight cases, briefly: One apparently cured, four greatly improved and still improving, two unimproved, one apparently injured by the treatment.

These results, though the number of cases is limited, are encouraging, and were possibly more rapidly obtained than could have been expected by climatic and hygienic measures alone.

Although it is much too early to express an opinion as to the exact value of Koch's proposed treatment from my brief experience in its application, I have received the following impressions:

Treatment by injections of tuberculin is not applicable to all cases of phthisis, and in unsuitable cases (and even in apparently favorable cases when rapidly pushed) undoubtedly greatly aggravates the disease and hastens the inevitable end. The decision as to its applicability to a given case depends not only on the amount of disease present, but on its type, and, above all, on the state of the patient's nutritive powers. If these are fair or susceptible of being stimulated, and the pulmonary involvement is not excessive and apparently uncomplicated, injections of tuberculin may be resorted to with a reasonable hope of producing a marked, though possibly only temporary, improvement.

Koch's method is certainly the first thus far proposed which can be shown by clinical observation to produce a distinct and appreciable impression on the areas of diseased tissue, and the physical signs noted at the bedside support Koch's assumption as to the specific action which tuberculin produces on pulmonary infiltrations of a tubercular nature. It is yet too early to reach any conclusion as to the possibility of obtaining a cure as a result of this specific action, or to predict the remote dangers it

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may threaten. Tuberculin has no germicidal properties, and it does not seem at all probable that it can produce in the individual any immunity against further infection; so that it is only through its specific impression on tubercle, and on account of the marked alteration in the biological relations of the tubercle bacillus to the surrounding tissues which it produces, that a cure may be hoped for.

The scope of Koch's method of treatment, its evident dangers and its limitations, seem to me to depend greatly upon the fulfilment of its promise of producing immunity.

Koch himself evidently thought it capable of conferring at least a temporary protection against secondary germ invasion, for he states that "while under its influence guinea-pigs cease to react to tubercular inoculation," and he also says: "Meanwhile we must protect the healthy tissues from a fresh invasion of the germs by repeated injections of the remedy."

My own attempts at the production of artificial immunity in animals by preventive inoculations of tubercular products have proved so uniformly unsuccessful that I am inclined to think the deficiency in Koch's method lies in this very direction, and that injections of tuberculin are powerless to confer immunity.

The results of Virchow's autopsies, and the great frequency with which relapses occur even after tolerance has been established by the exhibition of large doses, already tend to confirm this view.

The only immunity, therefore, we can invoke to protect the patient against the dangers of reinfection while attempting to bring about, by injections of tuberculin, pathological changes tending to necrosis of tubercle, is that produced by all measures which have been found to improve nutrition. These measures consist of climate, an open-air life, hygiene, feeding, and medical supervision; and although, by combining with these the specific impression exercised by tuberculin on tubercle, the treatment of incipient phthisis seems at present to hold

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out an added promise, its success or failure will still depend in the future, as in the past, on the persistence and thoroughness of our efforts to stimulate nutrition.

Observations in Conjunction with the Use of the Pneumatic Cabinet.

By C. E. QUIMBY, M.D.

Mr. President and Fellows of the Academy:—It is with no little hesitancy that one presumes to offer in this hall medical testimony the value of which depends entirely upon the author's powers of judgment.

Were the point at issue simply the cure of pulmonary phthisis, one might add his contribution of cases, in the hope of swelling the totals nearer the point where conclusions drawn from mere numbers would be more or less exact.

When, however, we question the value of a remedy added to measures known to be frequently successful, we must either defer all judgment until the per cent of cures or failures has ceased to be a variable quantity, or else judge every case by itself upon the basis of the probable course of that case under previous methods of treatment. In accepting this latter course, and attempting to compare present with previous results in the treatment of phthisis, I desire first to make clear the basis of my estimate of the value of the pneumatic cabinet.

Quite a proportion of the patients treated with this instrument have been sent me by other physicians or have come solely for this special treatment. Such as responded to the treatment quickly, and gained rapidly in ways they could appreciate, were usually faithful and persistent in their attendance, although they often ceased their visits without warning, in many instances, as I afterward learned, because they considered themselves well. Others whose improvement was less apparent subjectively, or who came with little faith and expecting immediate cures, quickly wearied of the treatment.

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It is manifestly unjust to allow this latter class any influence in determining results, and equally illogical to draw conclusions from such patients as are benefited at once. Among the cases I have been able to follow for from three to four years, the first class, however, is not found in such proportion as to demand any extensive modification of apparent results.

Including only cases of this duration, I find but six per cent of deaths among patients with whom the treatment was begun before there were any physical evidences of softening, and who persisted in the use of the cabinet.

The degree of improvement and change in physical signs in other similar cases, at the time they were lost sight of, gave promise of nearly the same success. Although such figures give some idea of final results, nevertheless the grade of improvement has been so variable that I have come to consider each case separately, and, at times, to find no more encouragement in some cases that do well than in others which, seeming almost hopeless, are simply arrested. My estimation, then, of the value of the pneumatic cabinet in the treatment of phthisis, which forms the basis of comparison in the cases to be reported, is offered you largely as a matter of personal judgment. In forming this opinion during five years' daily use of the instrument—an opinion which, I am well aware, will be received with much incredulity—I have aimed in every instance to throw the burden of proof upon the cabinet, and I certainly began my work a thorough sceptic as to the possibility of curing phthisis. I now believe, setting aside a small number of chalk-and-water individuals who seem to be made as culture beds for tubercle bacilli, that from seventy-five to eighty per cent of localized pulmonary tuberculosis—so-called pneumonic phthisis—if seen reasonably early in the first stage, can be brought to and kept in a condition of practical cure here in New York City by the use of the pneumatic cabinet and adjuvant measures; that cases of diffused tuberculosis will be arrested in about fifty per cent of cases, but will require

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treatment for long periods; that subacute cases may be arrested and made quiescent when seen first in the second stage in a small proportion, possibly fifteen per cent, of cases; that third-stage cases, if chronic, are always relieved in their rational symptoms, and their downward course made much easier, while those following acute localized consolidation are benefited little, if any, and may be made worse. A part of this I know as well as believe. Bronchial hæmorrhages are arrested, almost without exception, at once, and, in my experience, do not return, except in the most acute cases.

Among nearly two hundred cases in all stages of the disease, I have seen but one hæmorrhage after a week's use of the cabinet, although quite a number were bleeding at the time they began the treatment.

I have to report for comparison with such results six cases treated with tuberculin in connection with the cabinet.

These cases are all males between twenty-five and thirty-five years of age, and have been under treatment since the middle and latter part of January, 1891. Nos. 1 and 2 were cases of localized consolidation at the apex —No. 1 of rather recent development; No. 2 of some two years' duration, with little change in that time. Nos. 3 and 4 were diffuse tuberculosis—No. 3 of at least four years' duration, with distinct fibroid changes; No. 4 of more recent development. No. 5 showed diffuse infiltration, with one or two areas more prominently affected. He had gone through an up-and-down history during the past four years in the East and West and in South America. No. 6 presented extensive consolidation in the right lung, with pleurisy, persistent exhausting cough, and abundant adhesive sputa, and was developing a cavity. Bacilli had been found in the sputa of all, and were present in January in all except No. 5. The diagnosis was confirmed in all except No. 6 by the President of this Academy.

These patients were all treated in accordance with the

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following indications, as formulated in my previous paper.

I. To prepare the patient's lungs by expansion, stimulation of circulation, and removal of catarrhal products. The cabinet was used for this purpose. No. 5 had been receiving this treatment for some weeks. The others were treated from four to eight times before receiving tuberculin.

II. To establish specific processes by inoculations of tuberculin until the physical signs indicate active changes in the lungs. The first inoculation in each case was one milligramme. In No. 4, owing to a suspected tuberculosis of the larynx, it was half a milligramme. The inoculations were repeated at intervals of from four days to two weeks, most frequently once a week. The second and following doses were varied from one to two milligrammes. No case has received more than two milligrammes at once nor more than twelve inoculations in three months.

III. To favor absorptive processes until the physical signs indicate subsidence of the active changes incited by the tuberculin. This implied the daily use of the cabinet.

IV. To render aseptic, as far as possible, the decomposing elements in the pulmonary lumen. For this all the patients have received with the cabinet antiseptic *vapors*, particularly creosote and pure alcohol, while some have used similar vapor inhalations at their own homes.

V. To stimulate by every possible means the general nutrition.

Under this plan of treatment, what have been the results and how do they compare with those from the cabinet alone?

Speaking generally, I can say all these patients are improved, both subjectively and as evidenced by the physical signs, except No. 2. He also has so improved in strength and general well-being that he has gone back to his work as a bookbinder, but the pulmonary infiltration, which had extended slowly during two years, has advanced rapidly

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and shows sign of softening. With the cabinet alone I should have expected not only to improve his general condition, but to arrest, with an even chance of absorbing partially, the infiltration. In No. 1 there was a steady and rapid improvement, after the primary disturbance following the first inoculation, in general health and physical signs. This patient, after getting what he called well, became very irregular in his use of the cabinet in March, and an inoculation at that time was followed by a hæmorrhage. He became frightened and disappeared early in April with his trouble more active again. No. 3, diffuse tuberculosis of long standing with fibroid changes, shows lower percussion note and stronger respiratory sounds of better quality. Fever and night sweats have entirely ceased. In general nutrition he is most decidedly improved. No. 4, a more recent case, shows similar changes in greater degree. No. 5 shows less clearly, in his physical signs, evidences of improvement than the others. He has spent long periods in Western phthisis climates, and last year had a hæmorrhage while in Idaho and Colorado. Heretofore he has found quite as much benefit from the cabinet as from climate, and has always gained in weight. This time, while he has improved subjectively and perhaps slightly in physical signs, he has lost flesh progressively after his first inoculation until they were stopped, since when he has gained again. In No. 6 each injection produced extensive increase in the physical evidences of inflammatory processes in the lung, which were rapidly removed, however, by the cabinet. The fourth injection was followed by a hæmorrhage, since when he has received cabinet treatment alone, with the result that he has taken a place as carrier in the post office, although unable to do any work when first seen. Such are the general results.

As bearing upon special points:

I. Bacilli have not disappeared from the sputa in any case, but are less abundant.

II. Cough and expectoration were increased after the

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first inoculations, but were speedily decreased in all cases. In one they were almost entirely arrested. Fever and night sweats were stopped.

III. Four of the six cases had hæmorrhages: both cases of local consolidation, the case of recent diffuse infiltration, and the second-stage case. After the hæmorrhages no more tuberculin was given, and they all improved rapidly in strength, and all but one in physical signs.

IV. The febrile reactions were in no case severe, and were least in the more chronic cases. The amount and frequency of the doses, however, were based solely on the physical signs, and, what I have not seen noted before, the patients developed no tolerance of the poison, but suffered quite as much from the later as the earlier injections. But one patient showed any marked gain in weight. It is suggestive that this patient is the only one who changed his manner of living to more favorable conditions, and may be taken in connection with the rather constant gain in weight of hospital cases.

Are these results better than could have been expected with the cabinet alone? In the subacute and chronic cases with fibroid changes, and where the pulmonary conditions are asthenic, yes. In the acute cases, and with extensive local consolidation in the early stages, no!—later, possibly yes! My formulated conclusion is this: Tuberculin is essentially a specialized caustic, and not to be used, therefore, when inflammatory processes are *acute* and *sthenic*, but when adynamic conditions characterize the reparative processes. Four months' trial of this remedy has served to strengthen my convictions as to the correctness of my former deductions (*Medical Record*, January 17th, 1891), but has also demonstrated how extensively hope becomes compressed by cold experience before it crystallizes into definite knowledge. Permit me, then, to quote briefly from what I wrote in January last:

"Cases of phthisis may be divided for treatment with sufficient exactness into three classes.

"I. Cases of infiltration without softening.

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"II. Cases in which necrotic changes are clearly established.

"III. Cases in which active changes are arrested or reparative processes are fairly developed.

"It is to the first class of cases that this treatment is particularly applicable, and it is perhaps safe to say it may be tested in all such cases. We shall undoubtedly find, however, that it must be used with much greater care in such as have developed consolidation rapidly than in the more chronic cases. I am inclined to believe that the resisting power which the system manifests to the invasion of the bacillus will largely indicate its tolerance of the changes induced by this remedy. In the second class of cases, where rapid necrosis has followed acute infiltration, any use of the lymph appears to me entirely unjustifiable before other measures have arrested in some degree the destructive changes. Where these processes are chronic and the patient is suffering quite as much from general sepsis and exhaustion, moderate doses at long intervals may excite a healthier activity in the affected tissues. In the third class I am unable to see any object to be gained by the re-establishment of degenerative processes.

"In every case the physical signs, and not the temperature, following an inoculation should be our guides in determining both the amount and frequency of the doses."

It is with no little satisfaction I can now say I have nothing to retract and essentially nothing to add to these statements, made before I had used tuberculin.

The *general discussion* was opened by DR. A. JACOBI, who said that he had already spoken upon this subject before the State Medical Society in Albany last February, and had then detailed a number of cases with the conclusions which he had reached, and these had been printed in the *Medical Record.* Children require relatively large doses, but it was advisable to begin with small doses in all cases, as the therapeutic effect does not depend upon the energy of the reaction, but, on the contrary, was found to be most favorable in those cases in which there was very little rise of temperature. As an

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instance of the impossibility of predicting the effect of this remedy upon any given patient, the speaker related the following remarkable case: The patient was a lady about forty years of age, who had had tuberculosis for at least ten years. She had had large tubercular tumors in the abdominal cavity, and had expectorated more pus than he had seen in any case for many years, and she had also suffered from night sweats. There were two large cavities in the lungs, and the sputum contained numerous bacilli. In the early part of the winter she had a pneumonia from which she recovered, but in December and in the early part of January she had some fever, although about January 10th, when the treatment with tuberculin was commenced, she was apparently in pretty fair condition. Her husband was a physician and watched the case constantly. Beginning with one milligramme, which gave no reaction, the dose was increased one milligramme each day until she received about forty milligrammes, and yet no reaction was produced. The dose was then increased by two or three milligrammes each day, until, about ten days ago, she was receiving about three hundred and fifty milligrammes daily. Although no reaction was produced, it was noticed that her fever would fall within an hour or so after each injection, and would remain so for eight or ten hours. At first the expectoration was more abundant, but it soon became more scanty, the number of bacilli was diminished, the night sweats and fever disappeared, the patient gained in flesh, and her general condition was decidedly better. A few days ago she had a slight fever from a fresh attack of bronchitis, but the cavities were decidedly smaller than before the treatment, and for weeks at a time no ronchi are present.*

In general, the treatment of surgical tuberculosis with tuberculin has been disappointing. Out of sixteen cases of pulmonary tuberculosis four were not improved, five were improved, four were much improved, two were cured, and one died. He thought that the best treatment in the future would be a combination of the climatic treatment with the careful use of tuberculin.

DR. E. C. WENDT said that he had employed Koch's tuberculin in thirty-eight cases—four of surgical tuberculosis, seven of phthisis, twenty-two cases of "strumous condition," four of ordinary bronchitis, and in one healthy

* The case terminated fatally in the spring of 1892.—A. J.

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person. It was interesting to note that in every case a febrile reaction was obtained, and this would seem to invalidate Koch's claim for the diagnostic value of tuberculin. In the four surgical cases the patients became a little less anæmic and the local condition improved slightly, but the general condition was not materially affected. Six of the phthisical cases were in the first stage and one in the second. All showed a decided gain in weight, and their general condition was improved, but in not a single instance were the physical signs improved. In the cases classified as strumous, and which consisted chiefly of children suffering from adenitis, the anæmia was improved, but there was no effect upon the glands. In cases with rude respiration this symptom persisted. The initial dose had been invariably one-fourth of a milligramme or less. On the whole, the results were disappointing, for neither the diagnostic value nor the therapeutic efficacy of tuberculin had been clearly shown in these cases. The subject must for the present be considered as *sub judice.*

DR. S. BARUCH'S experience with this method of treatment embraced sixteen cases. The injections always produced marked changes in the physical signs, and on one or two occasions a decided pneumonia, which, much to his surprise, had disappeared within about forty-eight hours. In one case, in the first stage of the disease, having cough, night sweats, sputum, and bacilli, there was a gain of fourteen and a half pounds and a disappearance of the bacilli. The case was, however, improving before by rain baths, creosote, and cod-liver oil, and lost ground during this treatment. Another patient, thirty-one years of age, also in the first stage, had had several hæmorrhages, and at the time of beginning the injections, on December 6th, 1890, he had gained sixteen and a quarter pounds under rain baths and hypophosphites. There was dulness at the apex, but no tubercle bacilli were present. The last injection, of sixty-five milligrammes, was given on April 15th, and produced no reaction, and there are no decided physical signs at present. He had gained twenty pounds at the time of his discharge, April 29th, although he lost during the injection stage. A nurse in the hospital who developed cough and expectoration, and had slight hæmorrhages with impaired resonance and fine moist râles, was found to have numerous tubercle bacilli in her sputum. She reacted to the first injection of one milligramme and to the twenty succeeding ones;

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but the last one, of forty-five milligrammes, given on April 1st, produced little reaction. She had gained six pounds under rain baths and tuberculin, there were no bacilli found, and she was discharged as probably cured. Dr. Baruch thought the tuberculin had some diagnostic value, and in one case of cavity was undoubtedly beneficial. The other cases had improved under hydrotherapy, creosote, and cod-liver oil, failed steadily under tuberculin, and again improved when the rain baths were resumed.

DR. H. S. STEARNS continued the discussion by referring to the results of two autopsies which had been made upon cases dying while under the treatment at Bellevue Hospital. In both cases, in addition to the old tubercular infiltration and fibroid condition, the lungs were filled with minute and recent miliary tubercles, probably as many as from four to eight nodules being present in any square centimetre. In both cases there was also general tubercular infiltration of the abdominal viscera.

In answer to a question from one of the Fellows, who had noticed in the cases under his observation marked acceleration of the pulse and a deepening of the respirations after the injections, DR. KINNICUTT said, in closing the discussion, that although very accurate and complete records of his cases had been kept regarding the variations in the pulse, respirations, and temperature, he had not noticed this peculiarity.

THE PRESIDENT said that he had seen one case in which there was a great acceleration of the pulse, and a slowing of the respirations, following each injection, so much so that symptoms of collapse were produced by a dose of one-tenth of a milligramme.

He thought the consensus of opinion was that we had in tuberculin an agent powerful for good and evil, and one requiring greater care in its use, and more extensive experience, than any other agent which had been given to us for the treatment of this disease; but he thought it would take a permanent place in the treatment of pulmonary tuberculosis, and that by its aid we would be able to save many more lives.

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*Stated Meeting, May 21st, 1891.**

WHY SYPHILIS IS NOT ABORTED BY THE EARLY DESTRUCTION OR EXCISION OF ITS INITIAL LESION.

By R. W. TAYLOR, M.D.,

CLINICAL PROFESSOR OF VENEREAL DISEASES AT THE COLLEGE OF PHYSICIANS AND SURGEONS, NEW YORK.

I KNOW of no better text as a prelude to this essay than the following statement recently made by that learned syphilographer of Paris, Dr. L. Jullien. He says:† "I believe in the possibility of interrupting or attenuating the course of syphilis at the time of its initial sclerosis; that we should not fold our arms during the period in which a patient's existence is to be decided, or to think that all is lost before anything has been commenced. This is the principle to which reasoning and experience have conducted me." From a very early date the idea of aborting syphilis by various means was entertained by surgeons, and this idea has prevailed until the present day. Ten or twelve years ago excision of chancre as a prophylactic measure was largely practised, and the communications are very numerous bearing upon the subject. The consensus of opinion among advanced syphilographers of to-day is that the operation is utterly futile, and only a small number, and among them M. Jullien, still cling to the opinion that syphilis may thus be suppressed. In round numbers, in medical literature,

* In charge of Section on Genito-urinary Surgery.

† "De la possibilité d'enrayer la syphilis après l'apparition du chancre induré," Bulletin Médical, 1891, No. 5, p. 35.

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about four hundred and sixty odd cases of excision of syphilitic chancres have been reported, and of these one hundred and six have been claimed as being successful. I have held for many years that the operation (useful in some cases as a therapeutic procedure) is utterly valueless as a means of destroying syphilis, and I have been searching for a long time the reason why. It appears to me that I have now learned the reason why thoroughly applied caustic and thermal destruction and generous excision have failed to limit syphilis to its early stage, and I shall here present the evidences of my belief. In order to make the subject clear to those not familiar with the literature of excision of chancre, I shall here interpolate four cases, two personal and two reported by other observers, in which, seemingly, under the most favorable circumstances, destruction and excision was performed without in any manner staying the course of the disease. I will first quote two of my own quite numerous cases: A patient came to me with a minute, slightly elevated, excoriated papule, not larger than the heads of four pins. The patient, a young man, was of a very nervous temperament, and very anxious about his sore, which he had seen for the first time that day. Twenty days before he had had connection with a woman, whom I examined and upon whom I found a disappearing chancre on the right labium minus, just above the fourchette, and a roseolous syphilide, typical in all particulars, on the body. I informed the gentleman that his sore was in all probability syphilitic in nature. At his request I excised it, taking the following stringent precautions to do the operation thoroughly: Previous to cutting, the penis was washed with soap and water, and then with carbolic acid water (five per cent). The sore was touched with pure nitric acid in order to destroy its virus and to prevent its exudation into the adjacent healthy tissues. It was then dusted with calomel, its base transfixed and cut away together with a liberal margin of healthy tissue. The wound, carefully kept from contamination of any kind, healed by granula-

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tion in about ten days. In spite of this, induration of the inguinal ganglia commenced, and was typical in extent and hardness thirty days after the operation. Forty-two days after the date of the discovery of the chancre the patient presented general syphilitic manifestations. This case is given in my treatise on venereal diseases.*

Another case, and a more recent one, is equally striking in all its features. A gentleman, aged thirty, came to me early in 1889 in great distress of mind concerning a lesion on his penis which he had noticed for the first time the night before while taking a hot bath. The reason of his fear and worry was that a friend had a few days before informed him that he had contracted a hard chancre from a woman with whom he had learned he (my patient) had had intercourse. Upon examination I found on the dorsum of the penis a very minute (one-tenth inch long) fissure of a dull violaceous color. I could discover no change in the inguinal ganglia. At his urgent request I examined the woman and found just within the vagina, in the sulcus to the right of the urethra, a red and inflamed patch, the seat of considerable thickening. In the light of what I found besides, I diagnosticated it as a declining hard chancre, of which I had seen many similar before. There was marked inguinal adenitis and a very faint disappearing roseola, a mucous patch on the right pillar of the fauces, and a slight falling-out of the hair. The certainty of the syphilitic nature of the sore on the patient's penis, which appeared seventeen days after coitus, being so convincing, its probable character was announced to him. The condition of the skin of the penis was such that the little fissure could be cut away by means of a very liberal elliptical incision, and no harm would be done to the integrity of the organ. Under the most careful technique, with thorough antisepsis, I excised a piece of skin half an inch wide and three-quarters of an inch long on the evening of the day upon which the fissure was first

* Bumstead and Taylor, p. 510. Philadelphia, 1883.

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noticed, and seventeen days after the infecting coitus. Examination of the patient was made almost daily. The wound healed kindly under iodoform and gauze, and was not followed by any induration in the minute scar which was formed. It was fully twenty days after the operation that well-marked inguinal adenopathy could be made out. In fifty-two days after the first appearance of the chancre well-marked secondary manifestations were observed.

These cases, and many others which I have thus treated over a period of many years, with a like result, convinced me that, even with the most painstaking, early, and generous excision, syphilis could not be suppressed or aborted.

In this connection, to lay emphasis to my remarks, I will quote the old-time case of Berkeley Hill, and the more recent one of Rasori, as they will serve the purpose of cumulative evidence, if such is needed. Berkeley Hill says:* "In July, 1858, a gentleman came to me with the following story: That morning, about 4 o'clock, during violent intercourse, he had felt a sudden snap. On awakening a few hours later he found that the frænum had been torn across and that he had bled freely. This made him anxious to know if there were any means to insure him against syphilis. At 3:30 P.M. of the same day I examined the part and found the frænum torn and the wound slightly swollen, but otherwise quiet enough. Ricord's views were then in vogue—that destruction of the sore within five days of its existence would prevent syphilis—and I assured him that cauterization would remove all danger of the disease. To make sure, I destroyed a considerable layer of tissue with fuming nitric acid. In due time the eschar separated. The surface healed very quickly, and my patient's satisfaction was extreme. This was at the end of July. In the latter part of August he called again and showed me the cicatrix, which he said he had noticed that morning to have altered. It was

* "Syphilis and Local Contagious Disorders," pp. 76, 77. London, 1881.

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clearly indurated. Presently the glands in the groin enlarged, general syphilis followed and lasted a couple of years."

It certainly must be confessed that all the circumstances in this case were very favorable to the annihilation of the syphilitic virus in that torn surface, and that all that energetic cauterization could do had been done without avail. This case stands as a classic, pointing out the futility of very early and active cauterization in preventing syphilis. It must be said, however, that this man tore the most vulnerable part of the penis, where the vessels are very numerous and the lymphatics very extensive and superficially situated. It proves very conclusively that under such conditions syphilis loses no time in gaining a foothold in the system.

Let us now quote the case of Rasori, which has had much weight in establishing the fact of the inutility of excision as a means of suppressing syphilis. Rasori * says: "A lawyer, aged twenty-eight, of robust constitution, came to him in February, 1881, and desired him to examine a woman with whom he had cohabited two hours before and whom he suspected to be syphilitic. Examination showed that she had extensive condylomata lata and a generalized roseola. Twenty-eight days elapsed, during which the anxious man examined himself minutely and bathed his penis so vigorously with antiseptic lotions and nitrate of silver solutions that he almost produced a severe balanoposthitis. On the evening of the twenty-seventh day the mucous membrane seemed normal, but the following morning he presented a little red lenticular papule the size of a hempseed on the internal layer of the prepuce toward the right. At the request of the patient Rasori immediately excised the lesion, together with a liberal amount of the surrounding tissues. The wound was irritated by the foolish exploratory manipulations of the patient, and did not heal until the twenty-fifth day after the operation.

* "Escissione di un ulcero duro alla 12a ora della sua apparizione," Giornale italiano delle mallattie veneree e della pelle, 1881, p. 343 et seq.

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Before this, however, the ganglia had become perceptibly swollen. Forty-eight days after the operation unmistakable generalized manifestations of syphilis appeared."

Gibier and Mauriac also excised chancres forty-eight hours after their appearance, yet syphilis followed in each case. Several other similar cases have been reported in the rich literature of the subject.

In spite of these seemingly convincing results, some observers still regarded the chancre as a local lesion and favored an abortive treatment.

Let us now consider my further experience.

The following personal case I will give with considerable detail, for upon it largely hang the conclusions reached in this essay. On January 3d, 1890, a gentleman came to me wishing to make an appointment for a date upon which I could circumcise him. At that time I made a preliminary examination of his penis, and on the free border of the prepuce I found a small, brownish-red, not excoriated papule, no larger than the head of a small tack. It struck me instantly that he had a hard chancre, for I had many times seen almost precisely such an insignificant lesion develop into a true syphilitic sclerosis. The patient was positive that when he took his bath on the previous morning there was no spot on his penis, and he thought there had been none in the evening. So circumstances seemed to warrant the view that it began in the night.

Upon questioning the gentleman I obtained the following facts: He lived in the suburbs of a large Southern city, and, as a rule, when he went to town he cohabited with a woman in some first-class house. He had been at his home, and had for a period of three months prior to December 20th, 1889, been perfectly continent. On that date he went to the city, transacted business during the day, and passed the night in the embraces of a lady of the town who he had been assured was perfectly clean and healthy. He had no further sexual intercourse until the time of his first visit to me, just fourteen days after

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this last coitus. At the consultation I explained my suspicions, thus fortified by a very clear and conclusive history, and urged the operation, thinking in my own mind that if ever there was a favorable opportunity for testing the value of excision of chancre as a prophylactic for syphilis, this was the case. It so happened that business of importance delayed the operation until January 7th, four days after the appearance of the chancre and eighteen days after the inoculation of the syphilitic infection. At this time no perceptible enlargement of the inguinal ganglia could be felt, a symptom looked for and also not found four days previously. The prepuce was removed, and, owing to its marked redundancy, fully one and a half inches of tissue were ablated. Healing took place promptly in a week, and no traces of induration were to be found in the cicatrix. Plenty of tissue remained to allow of full erections. The patient was watchful of himself and constantly came for inspection. On January 17th I thought I detected slight enlargement of the inguinal ganglia; but on the 20th of that month the adenopathy was very evident. From that date it increased until it became typical in all particulars. On February 21st a typical roseola appeared, which had been watched for daily during the preceding fortnight. At this time the ganglia in the neck and at the elbows were perceptibly enlarged and typically syphilitic. Prior to the evolution of the secondary period of syphilis I found very minute but hard cords running up the dorsum of the penis. The nature of the excised papule was therefore proved beyond doubt, and I congratulated myself that I had placed in a proper fluid for preservation and examination that redundant but precious prepuce.

I placed the morbid specimen in the hands of Dr. Van Gieson, with a view of learning all that was possible of the microscopic anatomy of the hard chancre at the earliest period of its development, and also of finding out, if possible, why it was that, in spite of this early and thorough ablation of the prepuce upon which the chancre

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was seated, syphilis had not been suppressed or aborted. At a later date I gave him a prepuce upon the lower part of which, near the frænum, was a typical hard chancre. In this case the incubation had been of sixteen days' duration, and the chancre was ten days old when it was excised. Consequently it presented the evidence of an infection which took place twenty-six days previously. In my judgment these two specimens are ample for the purpose of studying the early successive stages of syphilitic infection. I have learned from study years ago that when fully matured the initial sclerosis does not lend itself readily to microscopic examination. The tissues become so dense and compact that a clear idea cannot very often be gained of the relation of the composing structures. The microscopical appearance of these specimens is thus given by Dr. Van Gieson:

"*Microscopical Examination.*—In the first case there is a circumscribed mass of tissue, resembling in structure ordinary granulation tissue, about one-eighth of an inch in diameter, in the upper layers of the skin. The epidermis over this patch of tissue has the structure of a scab, and in places is absent, so that the patch has the appearance of a small and very superficial ulcer. This ulcer is sharply circumscribed, and there is but little diffuse infiltration of the surrounding skin, which is very nearly normal, except for the condition of the blood vessels, which are uniformly and universally changed throughout the whole section for a considerable distance on either side of the lesion.

"This change in the blood vessels consists in the distention of the perivascular spaces with small round cells. Nearly every vessel in the section, both arteries and veins, is in this way enveloped by masses of small round cells, forming a sheath like a coat sleeve around the arm. A few of the vessels do not have this investment. These are usually the larger arteries and veins.

"Besides this condition of the perivascular spaces there is a change in the endothelial cells lining the arteries and

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veins. The endothelial cells are swollen and seem to be proliferating.

"In two or three places the proliferation of the endothelial cells has gone on to such an extent as to produce thrombi in the lumen of the medium-sized veins.

"It is very difficult to say positively just what these cells around the vessels are and where they come from; yet from the fact that the vessels are affected in this way some distance from the ulcer, where the surrounding skin is very nearly normal, it would seem that the perivascular cell clusters are produced by the proliferation of the connective-tissue cells of the adventitia of the vessels, or by the proliferation of the connective-tissue cells just exterior to the adventitia.

"The second case, of longer duration, shows very much the same set of changes as in the first case, but has much less value in demonstrating the condition of the blood vessels, because the whole skin is more or less diffusely infiltrated with proliferating connective-tissue cells, or such as the ulcer is composed of in the first and earlier case. This extensive diffuse infiltration merges in with the perivascular cell clusters, so that their origin and distribution are less clearly marked than in the first case.

"In the second case, however, the excised portion was even larger than in the first case, and the sleeves of cells about the blood vessels could be traced to a greater distance from the point of infection.

"The great value of the first specimen is the very early stage of the infection, where the distribution of the tissue composing the lesion is so limited and circumscribed that the stage of development and arrangement of the perivascular cell investments can be studied clearly and fully. In chancres of later duration the diffuse infiltration of the skin is extensive and condensed, and it obscures the study of the blood-vessel changes; but even in these later chancres the blood vessels, either at a distance from the initial lesion or around the edges of a focus of granulation

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tissue, show the same accumulation of cells in the perivascular spaces.

"The point deserving of attention in the first case is the extremely early and far-extending involvement of the blood vessels. Although the primary sore in this first case is of but a few days' duration and very small, and under the microscope is of such limited and circumscribed extent, the blood vessels are very extensively surrounded by cell investments at a considerable distance from the ulcer. The microscope shows how deep-rooted syphilis is at the very beginning of the sore, by having propagated itself along the perivascular lymph spaces, and how futile it is, as experience has already shown, to attempt to stay syphilis by excising the primary sore. Apparently, judging from the appearance of the vessels in this case, their involvement begins before the appearance of the sore.

"The microscopical analysis of the case also shows how it is that the infection of syphilis travels from the primary sore and infects the body. The perivascular spaces are lymph spaces which communicate ultimately with the inguinal glands, and the enlargement of these glands is undoubtedly due to the advancement of this cell proliferation along the perivascular spaces until it reaches these lymph glands, and possibly the same process extends from the inguinal to another set of glands or lymphatics.

"Whatever the causal agent of syphilis is, it very soon reaches the perivascular spaces and travels along these spaces; or it initiates a proliferation of cells about the vessels, which rapidly propagates itself along the perivascular spaces to more distant tissues."

The foregoing facts can be very clearly understood by the study of Figs. 1 and 2.* In the central upper part of Fig. 1 the chancre is shown, composed of a mass of small round cells. It seems to be quite sharply marginated,

* See Medical Record, July 4th, 1891.

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and on each edge to be still covered with epithelium. Well down under the chancre the small veins are seen to be involved, and surrounded by their coat-sleeve-like sheath of small round cells. The blood vessels are shown in this figure as red spots, and the black dots around them correspond to the proliferated cells, which are placed in the manner already described. Then beyond the margin of the chancre we find the same condition of the vessels in skin which to the eye seemed normal. Therefore in this figure (No. 1) we see that as early as the fourth day of its appearance the chancre is well on its way to full development. But, further than this, it is apparent that the same morbid process is scattered around and beyond its margin. If the specimen had been studied alone with a view of determining how widely and how deeply we should cut in the prophylactic excision of chancre, we might conclude that taking in considerable space beyond the chancre and deeply down to the fascia would be sufficient. But we pushed the investigation still further, as shown in Fig. 2. This is an exact representation of sections taken from the skin of the prepuce at points remote from the chancre, a distance of nearly an inch, and which to the naked eye in life looked perfectly normal. In this figure we find the same morbid process going on. The rete is quite thickly studded with the infecting cells, and the vessels in the subcutaneous tissue are also, with one exception, involved in the same process as those near the chancre. At the bottom of the figure there are a number of these infiltrated vessels—a fact which shows how deeply the infective process had extended. There is abundant evidence from many careful observers to prove that the invasion of the syphilitic poison takes place by way of the veins chiefly, in a less degree with the arteries, and also by way of the lymph spaces. These specimens show this very clearly.

The facts brought out in the examination of the second specimen, representing the infective process twenty-six

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days old, are fully confirmatory of the results found in Figs. 1 and 2. The specimens show that at a distance of fully an inch and a half from the chancre the cell changes around the vessels are very marked and in active stage of proliferation.

These studies, therefore, go to show that in the very first days of syphilitic infection, as shown by the chancre after the first period of incubation, the poison is deeply rooted beneath the initial lesion, and that it extends far beyond it; that it is in a most active state, and, running along the course of the vessels, it soon infects all the parts beyond, even to the root of the penis. These studies seem to warrant the conclusion that the virus is not localized to its point of entry, and that it does not shut itself in by throwing out a dense wall of circumvallation, which later on disappears and allows of the exudation of the morbid products of the heretofore supposed closed-in morbid focus. Clinical and pathological facts go to show that the infective process occurs very rapidly. Berkeley Hill's case comes in here with significant teaching. So rapid had been the infection that very complete destruction of the torn surface only twelve hours after the infecting coitus failed to suppress or abort the disease.

The cases of Rasori and my own foregoing ones show very clearly that it is utterly futile to rely on excision as a prophylactic measure after the chancre has appeared. The poison seems to strike at once for the smaller vessels, chiefly the veins, and to run along them with great rapidity and with exuberant growth. Therefore, contrary to the ideas hitherto held, it is certain that in the first period of incubation the infection is going on rapidly and actively by diffusion, instead of, as we formerly supposed, smouldering in a cold and aphlegmasic manner in a sharply limited space.

To my mind, therefore, the facts presented show very clearly that the infective process in syphilis is, from the very beginning, one of constant growth and diffusion. In support of this I think I can with advantage present

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some results of the study of the so-called lymphatic cord of syphilis, which, according to the old ideas, running from the storage battery—as we may figuratively here term the chancre—along the dorsum or sides of the penis to the groin, empties into the inguinal ganglia the infectious material gathered up by the radicles. These studies have been made by Dr. Külneff,* of St. Petersburg, under the auspices of Prof. Tarnowsky, who has excised portions of five of these cords, taken from patients having true hard chancres about the prepuce and glans. These cords varied in size from a knitting needle to a lead pencil, and were situated just under the skin in the loose connective tissue, as we usually find them. The chancres were from a fortnight to two months' duration. The morbid changes found in these excised cords are substantially the same as those shown in my figures, Nos. 1 and 2. Külneff reaches the following conclusions: 1. The cord occurring in cases of primary syphilitic sclerosis results from inflammation of the subcutaneous veins of the penis. In other words, it is a manifestation of syphilitic endo- and periphlebitis. 2. The morbid process commences primarily in the vein, probably in its interior, which becomes vascularized and densely infiltrated with epithelial or granulation cells, accumulating especially on its periphery, close to the muscular coat, where they form thick layers. The endothelium undergoes hyaline degeneration, and the vascular lumen is filled up with a thrombosis. Consecutively, both the media and adventitia, as well as the adjoining connective tissue, become intensely infiltrated with granulation cells, which show a distinct tendency to transformation into young connective-tissue corpuscles. The small-sized veins in the vicinity are found to be blocked up with red blood corpuscles and surrounded with minute extravasations, while the arteries are seen to be empty or collapsed. 3. The size of the syphilitic cord in the same stage of the

* "On the Question of the So-called Lymphangitis in the Early Stage of the Primary Syphilitic Sclerosis," St. Petersburg Inaugural Dissertations, 1889.

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process is dependent upon the intensity and extent of the inflammatory process. 4. The tendency of the cell infiltration to pass into young connective-tissue elements seems to point out that the nature of the morbid process is identical with that of the initial syphilitic sclerosis. 5. The development of the cord should be regarded as an early manifestation of vascular lesions in syphilitic patients.

The gross appearances of these cords, and their relation to the size of the lymphatics, are well shown in Figs. 3 and 4, which are exact reproductions from Külneff's essay.

It will be seen that the results of the examinations of my cases of very early syphilitic infection dovetail completely and conclusively with those of Külneff, who studied tissues farther up the penis which were the seat of older infection. The conclusion is warranted, I think, that the changes which take place in the chancre and small radical vessels run up quite promptly to the larger efferent vessels, and largely through them is the poison carried into the system.

Ricord,* in his later years, has said that he considered the destruction of the infecting chancre as absolutely useless (in a prophylactic sense), no matter how early it is done; that it is certain that, even before its appearance, syphilis exists; and that, even if the entire penis should be amputated before the chancre showed itself, syphilis would follow nevertheless. This certainly is a rather broad statement, but in a measure it is warranted by the facts which have just been developed.

In this essay I have sought to show why syphilis is not aborted by excision of its initial lesion with a liberal slice of the surrounding parts. The reason, succinctly stated, is that (contrary to the present view) the syphilitic infective process is from the very start a quite rapid one;

* Oral communication to Leloir: "De la Destruction du Chancre comme moyen abortif de la Syphilis," Annales de Dermat. et de Syphilographie, 1881, p. 96.

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that the poison strikes directly for the blood vessels, and, causing there its peculiar changes, runs along them with astonishing rapidity. Thus it gains a foothold in parts beyond the reach of the knife, the caustics, or electrolysis. In fact, the tissues of the whole penis in very early syphilis are, we may say, honeycombed by these infected vessels. These observations just presented, backed by the evidence of the failures in chancre excision, go to show that beyond the chancre there is sufficient syphilitic poison to infect the whole economy, and that the initial lesion, though the visible and exuberant evidence of syphilitic infection, may be removed without in any way altering or modifying the course of the disease. It is rather too early to inquire into the *modus operandi* of the maturing syphilitic infection, but it seems probable that this vessel cell growth goes on and on until the whole economy is involved, and that then the explosion occurs which we call the evolution of the secondary period of the disease.

I am as yet unsettled in my mind as to whether or not these observations will lead to the definite opinion that antisyphilitic treatment should be instituted just as soon as we positively see the first appearance of the chancre.

DISCUSSION.

The first paper was not open for discussion, but Dr. A. Jacobi ventured to ask the author a question. Many authorities claimed that the use of iodide of potassium or mercury should not be resorted to until the secondary symptoms made their appearance. Dr. Taylor had demonstrated the fact this evening that constitutional syphilis existed as soon as, and even before, the initial lesion became manifest. This had always been the speaker's belief, and it demonstrated clearly why in the past his cauterization of the initial lesion for the abortion of syphilis had proven useless. But he thought it also showed that specific treatment should not be postponed until the eruption made its appearance. He asked Dr. Taylor if this was not a legitimate conclusion to be drawn from his paper.

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DR. TAYLOR replied that the clinical experience of many eminent men, and his own, went to show that in practice patients got along better who did not receive the mercurial treatment until the secondary eruption had made its appearance. It was very desirable to obtain the moral effect of the eruption appearing at the regular period, in order to secure submission to thorough and necessarily long-continued treatment.

DR. JACOBI was not convinced. He felt more interest in the patient's future physical welfare, based on early treatment, than hope of influencing morals which were already rather shaky.

SOME PRACTICAL SUGGESTIONS FOR DEEP URETHRAL MEDICATION IN THE TREATMENT OF POSTERIOR URETHRAL CATARRH.

BY E. L. KEYES, M.D.,

NEW YORK.

MR. PRESIDENT AND FELLOWS OF THE ACADEMY:—When I was asked to add my voice to the entertainment which the Section I help to represent is expected to afford you to-night, I cast about me for a subject which, while as free from technicality as possible, might yet be far-reaching enough to interest the greater number, and at the same time probably provoke from the fellow-members of my Section a discussion profitable for all.

I have been unable to select one which seemed to me more appropriate than the one I have chosen. For posterior urethritis has become of late years a malady very well recognized by those who deal closely and often with genito-urinary cases, and its management is much simpler than what it was a few years ago; yet there exists in the profession at large, seemingly, a lamentable ignorance about it which leads to much misconception and a considerable amount of mismanagement of cases the diagnosis of which is very easy and the treatment of which may be successfully carried out by any one in many

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instances without calling for expert skill in the use of instruments. I have certain ideas on these subjects, ideas which have brought me to the satisfactory conduct of some very stubborn cases, and if the display of these in a general assembly like the present can lead the mind of any one, until now unaccustomed to make distinctions, to a little more thoughtfulness and the exercise of something like logic in the diagnosis of gleet, and in that way to a more general application of reasonable therapeutics, I shall feel repaid for whatever effort this paper may cost me.

A gleet, as we all know, is not a disease. It is simply a symptom of some morbid condition, the nature of which it should be the function of the physician to determine; and it is as irrational to prescribe for a gleet in any hope of curing the malady which occasions it, as it is to prescribe for cough with the same end in view, without first by physical examination endeavoring to ascertain the source from which the symptom derives. Yet my experience leads me to believe that in the profession at large the opposite course obtains, and that a gleet is treated in a routine way by the vast majority of practitioners, either by injections and internal medicine, or by sounds, or internal urethrotomy, or all, according to the imagination of the prescriber, which leads him to generalize as to the causes of gleet and the methods of curing it.

This generalization is based upon the very undeniable efficacy of injections in most gleety conditions, and upon the widespread and very proper belief that one of the most constant symptoms of urethral stricture is gleet.

Such a generalization would be not unprofitable in a therapeutic sense if any one were in a position to say exactly what stricture is; but the modern doctrine of stricture of large calibre has rendered this well-nigh an impossibility, for every natural undulation of the canal may be so classed by the physician who is properly impregnated with the large-calibred stricture idea, and he is sure to find what he looks for in every case of gleet.

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And so it turns out in many and very many an instance. When a patient with a gleet seeks advice, his physician has no thought of, perhaps little knowledge of, the possibilities and the prevalence of posterior urethritis; he neglects to make the very simple tests by which posterior urethritis may be demonstrated, and he first injects his patient and dilates or cuts his urethra, on the stricture theory—often to the considerable detriment of his patient, who finds himself after the treatment with his gleet still persisting, and the added discomfort of a wide-mouthed, dribbling urethra which never clears itself entirely after the urinary act, or possibly a permanent deviation of the penis from the correct line during erection (as a result of over-cutting), or a relapsing epididymitis or permanently irritable bladder from the injudicious use of very large sounds.

I make this general criticism not as directed against any urethral therapeutic measure, or any school of thought in urethral pathology. I personally believe in, advocate, and practise the cutting of anterior (and some posterior) strictures, of large as well as small calibre, when, but only when, they can be demonstrated to be the cause of the gleet which is to be overcome. My criticism is directed against the indiscriminate employment of a method most useful when appropriate, and against the frequent neglect of such a study of the case as would lead in many instances to a direct localization of the cause of the gleet in the posterior urethra, and thus save the patient unnecessary mutilation, and the general body of the profession many animadversions from the laity.

I speak of what I do know, and can state honestly that the vast majority of cases of chronic gleet which come to me or are referred to me for advice have already been cut anteriorly in the urethra from one to eleven times, and that very few of them have ever been tested by their attendants, or any effort made to ascertain whether they had posterior urethritis or not.

Such a state of affairs is not professionally creditable

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and although neither I nor any one (in my opinion and belief) can tell you how to cure every case of posterior urethritis, still one may easily learn how to cure many and diagnosticate all cases, and at least may know what he is treating and how to direct his fire against it, rather than to take a random shot into the bushes in the hope of bringing down some game, because, forsooth, some feathers are seen on the boughs.

Gleet is really an insignificant matter (unless still virulent, a point I do not care to touch upon in this paper), and if a like amount of mucus or muco-pus escaped daily from a man's nose, or mouth, or anus, or even his ears or eyes, it would generally discomfort him not at all, or certainly much less than it does when he sees it exuding or milks it out of his urethral canal. Gleet must be classed with the little miseries of life, like shirt buttons, and corns, a mother-in-law, a wrinkled stocking, a cross in hopeless love. Yet philosophers have discovered that it is the sum of these little miseries that make up the real woes of life, and there are few of us who have not seen a very sensible man driven nearly to the verge of desperation and despair by the very insignificant torture of a protracted urethral discharge; therefore it is worthy of consideration, and any means tending to modify it is deserving of respectful contemplation.

The morbid conditions capable of producing a gleet are very many, so many that I shall not weary you by enumerating them here, since it is my intention to deal only with that variety dependent upon posterior urethral catarrh. I need only say that when a gleet is due to anterior urethral catarrh, caused by stricture, granulations, or what not, the source of the pus may be demonstrated without the endoscope by gentle, thorough, hot irrigation of the anterior urethra by means of a soft catheter passed into the sinus of the bulb, and the immediate subsequent use of the simple metallic bulbous bougie, provided the meatus be reasonably large; for if the pus comes from granular or strictured portions of the

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pendulous urethra, the irrigation will only wash away what lies loose in the canal, and the bulb will subsequently bring forth upon its shoulder soft, muco-purulent clots, generally tinged with blood, which have been scraped off the excoriated areas, from around which the inflamed mucous membrane secretes whatever free pus exists. There may be tight areas which the bulb will detect, but if there be not a granulating surface upon the tight area or behind it, which the bloody muco-purulent clots on the shoulder of the bulb will demonstrate or their absence disprove, then the cutting of such tight areas will not, in my opinion, favorably modify a given gleet in most instances. Yet, even allowing that there be some tightish areas, and even granting that they be moderately granular, still if there be posterior urethritis the cutting of the tight areas, although it may greatly moderate, will not cure the gleet, and the patient should be so informed before any cutting operation is undertaken; or he is quite sure to be disappointed, and often to misjudge the physician who has been zealously working for his relief.

Therefore, again, it is desirable to recognize the existence of posterior urethritis, even when it is associated—as is often the case—with coincident anterior urethral catarrh; and the manner of doing this is so simple that it is surely worthy of being put on trial. Indeed, this diagnostic method is so well and so generally known that I almost hesitate to present it before a body of gentlemen so well equipped in general knowledge as the members of this Academy certainly are; yet its constant neglect in good hands emboldens me and fortifies me in reiterating it with emphasis before you.

When there is posterior urethritis, from whatever cause, the quantity of pus lying in the urethra behind the bulbo-membranous junction is disproportionately great when compared with the amount of gleety discharge that appears at the meatus. This may be easily demonstrated.

When pus forms in front of the triangular ligament, it readily and promptly, for the most part, favored by grav-

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ity and the fact that the urethral walls lie in contact with each other, reaches the meatus. When it forms behind the bulbo-membranous junction it more readily takes the opposite course, flowing backward into the prostatic sinus and into the bladder.

When, therefore, a case of gleet is examined, if the urethra be milked by firm pressure with the finger, from the perineum forward, until all the pus that will come be squeezed out, and then the patient be instructed to urinate in two parts, into separate glasses, if he have even moderate posterior urethritis the quantity of pus mixed with the first urinary gush, representing the washing-out of the deep urethra, will be disproportionately great when compared with what has flowed out spontaneously from the meatus or been milked out by the physician before the urinary act, as shown by gross inspection of the specimen. And if the grade of posterior urethritis be intense, not only will the first urinary gush be purulent, but also the entire second urinary flow will be turbid with pus. In case of doubt the anterior urethra may be irrigated before the urinary test in two flows is applied.

The one obvious source of error here is a focus of suppuration in the substance of the prostate, in a seminal vesicle, in the bladder, or in the kidney.

The differentiation of these sources of purulent flow opens up a field rather too wide to be critically considered in a paper of the limited length my time affords. Suffice it to say that prostatic and seminal vesicular suppuration may usually be demonstrated by a milking of the prostate and seminal vesicles by a finger in the rectum, between the first and second urinary flows, a portion of urine being retained in the bladder to be ejected in a third urinary flow and the specimens examined microscopically after settling.

Bladder and kidney suppurations, although they may occur in company with both anterior and posterior urethritis, and will, of course, render all the urinary speci-

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mens turbid with pus, are beyond the scope of this paper and need not be considered.

The commonest kind of posterior urethral catarrh, ordinarily following a protracted gonorrhœa, is the one upon which I prefer to concentrate my and your attention.

Its clinical picture is this: A patient has gonorrhœa following a more or less protracted course, perhaps complicated toward the end with swelled testicle or a more or less pronounced attack of gonorrhœal cystitis or vesical irritability, and then subsiding into a condition of mild gleet. Such a patient procures some, as he conceives, suitable injection, and as long as he continues to use it once or twice a day his urethra remains apparently dry and he considers himself well. Within a day or two, however, after leaving off his favorite injection, the discharge reappears and goes on to reach a certain grade of intensity, possibly without other symptoms, or perhaps accompanied by itching or discomforting sensations in the anterior urethra near the meatus, or referred to the perineum, and sometimes accompanied by a little urinary urgency and precipitancy. Such a man, even while keeping down his show of gleet by means of injections, will notice that if he drinks wine or spirits, or if he indulges in sexual intercourse, especially to excess, or even if he has a nocturnal emission, that his show of gleet will certainly become promptly aggravated. These are the cases that get a new gonorrhœa every few months, and those who claim to have acquired a new discharge from perfectly healthy women—and their number in the community is considerable.

They are cases of posterior urethritis often pure and simple. They fly from one nostrum to another and from one physician to another. Sooner or later all of them have the anterior urethra widely cut for alleged stricture of large calibre, and some of them by this means receive temporary, others permanent, benefit—when the membranous urethra is the seat of soft stricture which keeps up

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the posterior urethritis in their particular cases, and when the deep urethra will tolerate the passage of sounds without resenting the traumatic violence thereby inflicted.

But this factor of deep-urethra tolerance to sounds does not by any means always exist, and the sequel to the cutting and the passage through the deep urethra of large dilating instruments is quite often an aggravation of the discharge and a lighting-up either of mild cystitis, prostatitis, or epididymitis.

This picture is surely a familiar one to many of you.

Take such a patient at his best, between his acuter attacks, when he thinks that he is keeping himself well, as he calls it, by the use of an injection, and when he has no visible show of gleet, and ask him to urinate in a glass. Floating about in the urine will be noticed cottony chunks and irregular masses of fleecy muco-pus (not simple compact linear shreds) and more or less free pus. This patient is playing the ostrich rôle, and ignorantly imagining that because he sees nothing there is nothing to see, when all the while the drops of pus are oozing backward in his urethra and being washed out by each urinary act—drops which, if they did come forward and show at his meatus, would convince him that his injection was a snare, and only a mask to conceal the presence of the enemy.

If one of these little, fluffy, cottony chunks that float about in the urine be caught up in a pipette and examined microscopically, it will be found to be made up of more or less closely arranged rows or layers of pus cells, strung out in striated films of colloidal prostatic mucus, entrapping the larger oval and rounded succulent cells from the neck of the bladder, some granular bodies, occasionally a crystal of oxalate of lime or uric acid, occasionally a stray spermatic element or a sympexion, sometimes a perfect hyaline prostatic cast—a cast to deceive even the elect, especially when, as is often the case in patients showing prostatic casts, particularly if there be also spermatozoa, the urine contains a faint trace of albumin.

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A case like the typical one I have just described is often posterior urethritis pure and simple; there may be a small meatus and points of physiological anterior narrowing, but often the posterior urethra is alone at fault and is responsible for the relapsing attacks of urethritis and for the mild, persistent gleet.

The sceptical among you may well ask at this point, if this be a case of pure posterior urethritis, why does any of the discharge at all show at the meatus, and why does an injection, which does not reach the alleged diseased area behind the triangular ligament, so positively moderate or even control the anterior discharge, at least in so far as causing it to cease to appear at the meatus is concerned? The explanation is easy.

Although the focus of disease is posterior to the bulbo-membranous junction, yet the congestion extends forward along the mucous membrane into the sinus of the bulbous urethra, and from this point a moderate oozing of pus occurs, as well as, to a very moderate extent, from the true focus of disease behind the bulbo-membranous junction. Now, the injection reaches and acts as an astringent upon the turgid vessels in the bulbous sinus, and the astringent exerts itself along the continuity of mucous-membranous surface to a moderate extent into the membranous urethra and beyond the bulbo-membranous junction, and a repetition of the injection by a continuance of astringent action keeps down the discharge without reaching or curing the actual focus of disease itself; for if the anterior injection be too strong or be forcibly crowded back too far, cystitis or swelled testicle is, as is well known, a not uncommon result.

That a local application, acting simply upon the livid, congested membrane in the sinus of the bulb, may control a gleet without curing it, can be often demonstrated by touching this livid membrane carefully with an astringent through an endoscopic tube; and that an application made on one side the bulbo-membranous junction extends its influence more or less to the other side may be also

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demonstrated by making a membranous urethral instillation of nitrate of silver, ever so carefully, and then inspecting the mucous membrane of the bulb, anterior to the triangular ligament, through an endoscopic tube. This spot, before of a more or less livid red, shows the pale-white staining of the nitrate of silver solution. This fact was first observed and pointed out to me by Dr. James P. Tuttle; the only possible criticism upon its accuracy is that a minute portion of the silver solution has followed the injecting instrument on its withdrawal, in spite of all precautions taken.

But my subject drags. I came here to make some practical suggestions to cure posterior urethritis, and must hasten to that point. My suggestions are certain substances to be injected into the seat and focus of the disease with the deep urethral syringe. The method is not new; some of the substances are not ordinarily in use.

I do not at all claim that posterior urethritis must be treated locally to get well. On the contrary, most cases ultimately get well, and they do so without local treatment. Rest, the balsams and alkalies, the demulcent drinks, counter-irritation, time, change of air, sea trips, treating the anterior urethra, iron in chronic cases—all these things are potential, and most of them can be happily combined with the local posterior treatment to the great advantage of the latter, and their co-operation is sometimes essential to the rapid and perfect effectiveness of the posterior treatment. I do claim, however, that most cases are suitable for local direct treatment, and that such cases under suitable local applications improve with a rapidity which is gratifying to the physician and quite obvious to the patient; and I claim further that by recognizing the malady and treating it locally, many a urethra may be spared the use of the knife and very much time saved.

Finally, I state candidly that a few cases are positively unsuited to local treatment and get worse under it, no matter what substance is injected. To this class belong

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most tubercular cases and some simple inflammatory, and some ordinary gonorrhœal cases. When, however, the treatment disagrees, the symptoms (notably the discharge of pus) become so promptly and so obviously aggravated that the futility of repeating the application becomes at once clear, while very little time is lost in making the test. I may add, finally, that there is practically no danger of producing cystitis or epididymitis if the instrument be used carefully and not inserted too far. The risk of occasioning these complications is vastly less, according to my experience and belief, than that incurred by treating the malady with anterior injections or with sounds—or, indeed, less than is the risk of these complications if it is left untreated locally and internal medication be relied upon.

The instrument I employ is the syringe that bears my name. It is founded upon Ulzman's model, and is superior to the latter in being made in one piece, so that no injection soils the fingers, and in being more solid. Guyon's syringe has a bulb at its extremity and injects backward. It must, therefore, be introduced through the inflamed area to be effective—a manœuvre which inflicts unnecessary mechanical violence upon the tender parts. The same objection obtains in the case of all syringes having lateral holes or slits. My syringe and that of Ulzman have only one minute opening, at the tip. This tip need be inserted only just within the hole in the triangular ligament, just beyond the bulbo-membranous junction. So inserted, the membranous urethra grasps the tip of the instrument, and the contents of the syringe—twenty minims or more—may be gently thrown in, and the entire injection will quietly flow backward along the membranous urethra, through the prostate, and into the bladder, with as little violence as possible, not one drop escaping at the meatus upon the withdrawal of the syringe. The little air sucked up into the syringe upon charging it may be disregarded, as it remains at the top of the instrument and in its tube, and need not be discharged into the urethra.

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Formerly, in using strong injections I deemed it important to throw in only a very few drops at the diseased focus. Now I endeavor to produce my result by using much milder injections than formerly, and I throw in the entire contents of the syringe in every instance, except where nitrate of silver is used in a strength greater than ten grains to the ounce, when I use a few drops only. I increase the strength of injection of a given substance only gradually, after establishing a tolerance of the milder strength, and in this way I avoid irritation, formerly more common. When the source of the flow of pus is reasonably well forward in the membranous urethra, I generally make the injection before the patient urinates. When the inflammation extends further backward and the supply of pus is considerable, I cause the patient to urinate just before making the injection, so that the injected fluid may flow into the bladder and become applied thoroughly to the mucous membrane at the internal prostatic urethral orifice, without being there diluted or neutralized by coming into contact with urine in the bladder at this point.

In suitable cases the free pus first disappears from the second urinary flow (the urine being voided in two parts), then it disappears entirely from the urine, some shreds still remaining. These are attacked by increasing the strength of the injected fluid, or, if there be some stricture in the membranous urethra, by the safe use of sounds after the catarrhal surface has been modified by the previous use of the injections, combined often with anterior astringent injections which the patient administers himself.

I have employed in deep urethral injection most of the substances which have repute in controlling the flow of pus from mucous membranes, even Pond's Extract—such substances as hydrastin, boroglyceride, nearly all the lead and zinc salts, iodoform, creolin, pyoktanin, etc.; but at the present writing I have come to rely almost exclusively upon four substances—the sulphate of thallin, the glycerole of tannin, the sulphate of copper, and the ni-

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trate of silver. I never now make a preparatory injection of cocaine, as I consider it unnecessary, often harmful.

The Sulphate of Thallin.—This I consider a very valuable drug. Its chemical name is tetrahydrotarachin-anisol. It was introduced into anterior urethral medication as an ordinary injection, with words of high praise, by Goll, of Zürich, about five years ago, and since that time has constantly appeared as one of the ingredients of the antrophore, an instrument of torture when employed in the deep urethra, which I only mention to protest against. I am not aware that any one else has employed it in solution for deep urethral medication. I have so used it for about four years, and always with increasing frequency and confidence. It is bland and practically unirritating, and may be used up to a saturated solution, which is about twenty-four per cent. It is suitable for all the acuter forms of inflammation (except in cases of acute, frank, recent gonorrhœal cystitis, in which the nitrate of silver has the preference), and it is the substance I almost invariably commence with, in a solution in water of about three per cent, increasing at each injection up to six, nine, and twelve per cent. The last-named strength will usually do all that thallin can do in reducing the show of free pus in the first urinary rush. The intervals of making this mild injection are best spaced by two, three, or four days, according to the effect, which is sometimes wonderfully prompt and gratifying. The injection causes practically no discomfort, only a little warmth as a rule, and may be retained as long as the patient chooses.

The Sulphate of Copper.—This substance I use in a ten-per-cent solution in pure glycerin. This I dilute with water for use, commencing at about one grain to the ounce and working up rather rapidly, if it agrees and has a good effect, to the full forty-eight grains in the ounce. It is markedly astringent in suitable cases, and generally, in weak solutions, pains but little more than thallin; very strong solutions, however, of course feel hot and cause precipitate and moderately painful urination for perhaps

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several hours. The stronger the solution the longer the interval before a second application is advisable. I do not very often go above a strength of ten grains to the ounce.

The Glycerole of Tannin.—This substance, pure, is too thick to be sucked up into the syringe easily. I use it reduced by adding water, seventy-five, fifty, or twenty-five parts, where a more astringent (but sometimes less irritative) influence is aimed at than that procured by the copper solution.

The Nitrate of Silver.—I employ this remedy as high as a ten-per-cent solution, but very, very rarely—practically never in catarrhal cases—use anything like this strength. It is most useful in acute gonorrhœal cystitis, and as a final astringent when copper and tannin are not efficient. I dilute it with water at each time of application, commence usually at a strength of one grain to the ounce, and very rarely have to go beyond ten, making the applications every three to eight days, studying the effect and being guided by it. This is the harshest of the applications, causes the most pain, precipitancy, and urgency of urination (which often lasts several hours), but frequently renders incalculable service. Carefully used, it is free from the danger of producing complications.

By the careful and observant use of these four solutions, which any one may easily master after a few trials, the greatest advantage may be obtained in suitable cases of posterior urethritis. Did I not have them at my command, I think I should give up the treatment of gleet. When they disagree the fact is immediately obvious, and their good effect equally clear when they suit a given case, while their employment is generally progressively satisfactory. The thallin makes a black solution when used in the same syringe with the nitrate of silver, which it takes some time to wash out. I therefore use two syringes, one for thallin and tannin, the other for copper and silver.

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DISCUSSION.

DR. S. ALEXANDER said that at present much attention was being given the subject of gleet, especially among genito-urinary surgeons, and, considering the danger of going to extremes in a single method of treatment, he thought we could not have too many valuable papers like the one presented this evening. Touching on some of the points brought out, he expressed the view that gleet could not be considered one of the little things of life, in one sense. Those who had listened to a paper by Dr. Brewer during the winter, and the discussion thereon, would remember the fact which was then demonstrated, that the gonococcus might harbor in the urethra and be awakened to activity even after the discharge had nearly disappeared. One should, therefore, forbid intercourse as long as the gonococcus was present. The methods which the author had described for differentiating between a urethritis in the anterior and posterior urethra, had been practised by him with much satisfaction for a number of years. He had used nitrate of silver and sulphate of copper, and could speak favorably of them, but he was surprised that the author had been able to inject such a large amount of the solution. He thought he had on several occasions caused increased discharge by ten or fifteen minims of even a mild solution. The bladder would not stand a very strong solution of nitrate of silver; four grains to the ounce would cause a good deal of pain.

He thought that, as an aid in diagnosis, the endoscope should be used. It gave him a great deal more confidence in the treatment of the disease, and enabled him to judge better of the strength of solution which should be employed. Internal treatment was of considerable importance; the urine should be kept as bland as possible, not by giving an excess of alkalies, but by diluents.

DR. L. B. BANGS expressed his interest in the paper. Gleet could not, in his opinion, be considered one of the little things of life. It was the cause of much mental suffering, if not of moral torment, and to its cure the physician might well devote his time and highest degree of skill. He thought more attention might be given the pathology of the affection, which varied somewhat according to its location. In this direction the endoscope was of considerable value. It rendered the diagnosis more positive and added safety and rapidity to the treat-

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ment. Regarding the treatment, he had come to rely principally upon solutions of nitrate of silver in varying strength. He did not think that in using this agent it was sufficient to simply inject; it should be placed upon the diseased spot. In some very persistent cases, having determined the location of the urethritis to be in the bulbous urethra, he had injected ten or fifteen minims of a solution of nitrate of silver, one or two grains to the ounce, held it there, kneading the parts so as to drive the solution into the follicles, which seemed to be in those cases the hiding place of the disease.

In tubercular cases, to which allusion had been made in the paper, he had found instrumentation and solutions of nitrate of silver likely to aggravate the symptoms, but a solution of iodoform had proved beneficial. He agreed with what had been said against unnecessary use of instruments. It should be borne in mind that the penis was not made to put instruments into, and should be thus inflicted only when necessary. Still, there were cases of strictures of even large calibre in which it was humanitarian to overcome them.

Dr. G. E. Brewer had first made use of Dr. Keyes' modification of the Ulzman syringe in injecting the deep urethra, some years ago at Roosevelt Hospital, and had found its use result in the cure of a number of cases where treatment previously directed to the anterior urethra had failed. He had met with some cases of gonorrhœal cystitis, with bloody urine and painful urination about every five minutes, which he had relieved quickly, and ultimately cured, by injection of a solution of nitrate of silver, five grains to the ounce, into the deep urethra, some passing into the bladder. He had cured cases of granular condition at the neck of the bladder by injections of nitrate of silver, when, but for this mode of treatment, cystotomy would probably have been proposed by some surgeon.

Dr. F. T. Brown thought the methods of diagnosis described by Dr. Keyes would usually do away with the necessity for specular examination, but he had found the latter practical in most cases even of deep urethritis, and a valuable means of making a more positive diagnosis. If only the bulb was to be examined, and parts anterior to it, he thought one should always make an ocular demonstration, if no obstruction were in the way. He exhibited a mucoid thread, five or six inches long,

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which contained some gonococci, found in the urine of a man who had ceased to have any discharge; it had been coiled up in the posterior urethra, and showed the danger of such a patient spreading disease by intercourse. He also exhibited two instruments which he had devised, one for application of medicinal substances in ointments.

DR. F. R. STURGIS had come to make applications directly to the diseased spot, instead of by general injection. Nitrate of silver stood first; sulphate of zinc was useful, and he had applied it successfully rubbed up in vaseline and also in cold cream. There were some cases in which the discharge depended upon the constitutional condition, as anæmia, etc., and a sea voyage or change of climate was necessary.

DR. R. W. TAYLOR appreciated the diagnostic value of the methods mentioned in the paper, and the usefulness of Keyes' syringe, but said that sometimes injury resulted from this, especially in unskilled hands. He had been surprised that nothing had been said about Ulzman, who, he thought, had done more to relieve chronic urethral discharges than any one else. There was no portion of the human economy which required more gentle treatment than the male urethra, and one should use caution in employing a stiff silver catheter, whether it was in the form of Ulzman's syringe or Keyes' modification. A small, soft-rubber catheter with small holes near the end was a valuable instrument in applying nitrate of silver solutions.

DR. KEYES closed the discussion. His chief criticism of the discussion was that it had gone beyond the scope of his paper. A large quantity of a strong solution of nitrate of silver should not be used. He rarely employed more than ten grains to the ounce, seldom that much.

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Stated Meeting, June 4th, 1891.

THE PATHOLOGY OF THE ECLAMPSIA AND ALBUMINURIA OF PREGNANCY.

By R. VAN SANTVOORD, M.D.,

NEW YORK.

A VERY exceptional opportunity for following a case of albuminuria with eclamptic and other nervous symptoms, through two successive pregnancies, enabled me to make certain observations of interest in regard to the correlation existing between the renal and nervous phenomena. It has seemed to me that a summary of the present views held in regard to the subject, and a study of this case in the light of the opinions of others and of certain less complete observations of my own, might profitably engage the attention of the Academy.

It is generally recognized that albuminuria in pregnant women may be due to any of the various causes which give rise to it in non-pregnant individuals. Pregnant women may have chronic Bright's disease, acute Bright's disease of infectious origin, cardiac lesions, etc. Yet there can be no doubt that pregnancy itself in some way is a cause of a large number of albuminurias and attendant nervous phenomena. In individual cases, however, especially when nothing is known of the previous history of the patient, it is often difficult or impossible to determine whether or not an existing albuminuria is dependent upon the pregnancy, upon pre-existing disease, or intercurrent complication. In the case about to be cited, my professional acquaintance with the patient for years before pregnancy, the development of albuminuria under obser-

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vation during two successive pregnancies, and its disappearance shortly after delivery, with return of the patient to good general health, prove conclusively that it was a typical case of albuminuria due to pregnancy.

The fact that albuminuria and its associated phenomena are most often met with in primiparæ and twin pregnancies, gave rise to the supposition that they were due in some way to mechanical causes. The lesion found post mortem in the kidneys, in the majority of cases in which any marked lesion was present, has been parenchymatous degeneration with no involvement of the interstitial tissue. Where other changes have been found it has been argued with much plausibility that they are due to something besides pregnancy (Bartels). Experimentally, it has been shown that such a lesion may be caused by marked temporary obstruction of the renal veins, complete or partial temporary obstruction of the renal arteries, and by tying the ureters. Direct pressure on the renal veins by the pregnant uterus was the earliest proposed explanation. Bartels, however, has shown this to be anatomically impossible, and Cohnheim calls attention to the fact that usually the kidneys in this affection are markedly anæmic and show no evidence of venous congestion. To these objections it is answered that the general increase in abdominal pressure may be sufficient without direct pressure of the uterus on the veins, and that, as autopsies are usually obtained only after the uterus has been emptied of its contents, the venous congestion may have disappeared (Rosenstein). Albuminuria has, however, been observed to develop during the early months of pregnancy, and not infrequently disappears before delivery. This theory, therefore, seems to be as lacking in probability as it is in anatomical proof of its correctness. The same, I think, may be said of the supposition that the increased abdominal pressure may be sufficient to cause anæmia of the kidney by direct compression of the organ (Senator). A third theory—viz., that of temporary anæmia caused by arterial spasm—will be discussed later.

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Halbertsma* is convinced that more or less complete suppression of the urine, due to compression of the ureters at the pelvic brim, especially during labor, by the pregnant uterus, causes albuminuria and eclampsia, and he appeals to Söhlein's † observations in thirty-two autopsies of women dying after puerperal eclampsia. In eight of these cases dilatation of one or both ureters was found above the pelvic brim, no cause for which was obvious at time of autopsy (made after delivery), and all of which seemed referable to uterine compression. In one hundred and twenty-three non-eclamptic women dying before, during, or after labor, in four only was there any dilatation of the ureters, and in three of these there was sufficient cause found either in old processes or recent pelvic exudation. Cohnheim objects to this theory, that in the great majority of cases no dilatation of the ureters and no œdema of the kidneys is found post mortem. Söhlein himself says that in all of his eight cases some pathological changes in addition to those of the ureters were found, especially in the urinary organs, such as are frequently the only pathological changes in patients dying of eclampsia. He concludes that when an already insufficient excretion of urine from the kidneys exists, a new hindrance or interruption of the secretion of urine, due to the compression of the ureters, may give rise to uræmic symptoms or prolong those already in existence. This conclusion seems reasonable. A case recorded by Fleischlein‡ in which, while both kidneys were fatty, that on the side of a dilated ureter was most affected, is in accordance with this idea that compression of the ureters may be a factor in the causation of the lesion under discussion in some cases, but exceptional and of minor importance.

Still another possible mechanical cause of renal conges-

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* Transactions of International Congress, 1881, iv., p. 394.

† Zeitschr. für Geburtsh. und Gynäkol., 1879, p. 88.

‡ "Die Albuminurie in physiologischer und klinischer Beziehung," etc., p. 135. Berlin, 1890.

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tion and albuminuria is spoken of by Senator *—viz., the interference with the pulmonary circulation by the pressing upward of the diaphragm. That this factor may have some effect cannot be denied, but that this is the main cause of a malady which differs widely in its clinical course and post-mortem lesions from what is known to follow obstructed circulation through the thoracic viscera in other connections, is not claimed by him.

The great interest attached to the study of this form of albuminuria lies in its intimate association with eclampsia. For some writers, Carl Braun † for instance, eclampsia, occurring during pregnancy, labor, or after labor, is simply uræmia dependent upon renal insufficiency due to acute parenchymatous nephritis. The unsatisfactory nature of the attempts to explain this nephritis on purely mechanical grounds has been commented upon above. Certain other objections to their acceptance will be offered in the discussion of the relation between the disturbance of the renal function and eclampsia.

A great objection to the uræmic theory of puerperal eclampsia has been found in the fact that a very considerable number of cases have been recorded in which no albuminuria has been present before the occurrence of convulsions, and no grave renal lesions have been found post mortem. These are too numerous, and vouched for by too good authority, to be ascribed to imperfect observation. This unquestionable fact has led many writers, among them Nothnagel, to divide the cases into two categories, the uræmic and the non-uræmic, acute epileptic or eclamptic proper, the latter being supposed to be caused by reflex influences. An essential unity has, however, been insisted upon by many writers, one group regarding all the cases as of uræmic or toxæmic origin, the other regarding all as reflex. Among the latter Osthoff ‡

* Zeitschr. für Geburtsh. und Gynäkol., viii., p. 354.
† Ibid., Bd. viii.
‡ Volkmann's Samml. klin. Vorträge, No. 266.

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may be selected as the sturdiest supporter of the theory. He concludes that the essential cause of all forms of renal lesions and eclampsia occurring during pregnancy and labor, or after labor, is an unusually strong innervation of the splanchnics which results from the movements of the uterus in all stages of its growth and involution, and which extends itself to the vaso-constrictors of the kidneys, causing anæmia and degeneration, or to the vaso-motors of the medulla, causing convulsions, sometimes without previous affections of the kidneys. Convulsions occurring in other forms of nephritis he regards as reflex from the kidneys.

In support of this view he cites a case of his own in which, shortly after a first pregnancy, œdema, convulsions, albuminuria, and abortion were said to have occurred. Osthoff watched her through two succeeding later pregnancies, during which she had numerous and violent epileptiform convulsions, but during which the urine was never deficient in quantity, never contained casts, and never albumin, except shortly after delivery. She had obscure vision and high-tension pulse.

The fact that eclampsia occurs with greatest frequency during labor when reflex excitation is greatest, and that albuminuria, occurring, according to various observers, in a percentage of only five downward in pregnant women, is observed in percentages of from seventeen upward immediately after delivery, speaks very strongly, he thinks, for this theory. In support of the same, Santos* suggests, in addition to the above, the predominant frequency of eclampsia in primiparæ, twin pregnancies, and in women at full term in whom the uterine nerves are probably most compressed, labors artificially ended, young subjects in whom reflexes are more active than in older persons, and the quick disappearance of the albuminuria after the uterus is emptied. The reason why these reflex influences produce such effects only in a limited number of individuals is to be sought, he thinks, in the neurotic character of those who are affected.

* Arch. für Gynäkol., 1888, xxxii., p. 364.

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Osthoff, in addition to the above considerations, points to the fact that drugs, such as pilocarpine and the nitrites, which cause arterial relaxation, also have a controlling influence over so-called anæmic symptoms; the idea that the elimination of toxic substances through the sweating caused by the first-mentioned drug is of importance being rejected by him. The controlling effect of chloroform, chloral, and morphia, he thinks, points to the same conclusion.

There are certain details of this theory which are worthy of consideration. According to Traube, convulsions during pregnancy, and in Bright's disease generally, are caused by anæmia of the brain due to cerebral œdema, which is brought about by hydræmia and high arterial tension, not being directly due to the kidney disease at all. This explanation is adhered to by Rosenstein. Although on post-mortem examination in cases of eclampsia the brain has been found anæmic and œdematous more often than in any other condition, yet it has been also found congested, etc., as Cohnheim insists, without any obvious pathological change.* It seems, therefore, most plausible to regard the œdema or congestion, when present, as due to the convulsions, the variety in the brain conditions found on autopsy depending on the length of time elapsing between the convulsions and death, and the varying conditions of the heart and respiratory organs in different cases. It is, I think, now regarded as probable by most pathologists that, as the reflex theory supposes, the immediate exciting cause of epileptical convulsions is anæmia of the motor centres due to arterial contraction. To a slighter but more general and constant arterial contraction of reflex origin is attributed by Osthoff the high arterial tension of the malady. After labor it not infrequently happens that no urine reaches the bladder for several hours. During eclamptic attacks little or no urine

* Carter ("Uræmia," Lancet, vii., 1888), in two patients who died of uræmic convulsions, found the percentage of water in the brain normal.

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is secreted (Cohnheim). These phenomena seem best explained by supposing a more or less prolonged contraction of the renal arteries to take place. Cohnheim * calls attention to the fact that the renal changes found after death from eclampsia are often very slight or altogether wanting. He attributes the eclamptic seizure to the holding back in the blood of the urinary constituents by cramps of the renal arteries.

After delivery albumin is found temporarily in a large percentage of women. Among six hundred cases Santos † found albumin in three hundred and fifty-six, or 59.33 per cent, the urine being drawn by catheter and tested by boiling and Heller's test. The percentage found by other observers is much less (see Osthoff), but the fact seems to be well established. It may be plausibly argued that this albuminuria results from deranged nutrition of the kidney due to vascular cramps. It may be likened to the phenomena of dead and cyanotic fingers in Raynaud's disease, the less marked of which, viz., the dead fingers, is, according to Dieulafoy, common in Bright's disease. Whatever view may be taken of the etiology of the actual necrosis in this malady, these transitory phenomena seemed best explained by arterial contraction. Drs. Coleman and Taylor,‡ during these attacks of cyanosis in a case of Raynaud's disease, found coloration and breaking down of blood corpuscles, and coloration of the liquor sanguinis, in blood drawn from the affected fingers. This looks like demonstration that vascular cramps may be sufficient to cause grave changes in nutrition, and supports the assumption that vascular cramps may be sufficient to produce alterations in the renal tissue such as have been produced by experimental temporary lessening or shutting off of the blood supply from those organs.

If, then, we grant that arterial contraction is probably the immediate cause of the cerebral anæmia inducing

* Allgem. Pathol., vol. ii., p. 469, second edition.

† Arch. für Gynäkol., vol. xxxii.

‡ Lancet, 1890, vol. i., p. 967.

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eclampsia, and that it is also the cause of the anuria during convulsions and labor, and sometimes of disturbance of renal nutrition sufficient to allow albumin to pass through the glomerular vessels in recognizable quantities; granting also that reflex or emotional causes may in exceptional cases, in the pregnant as in the non-pregnant adult (Nothnagel), cause epileptoid convulsions—do all the known facts warrant us in accepting this theory of reflex origin as applicable to the great majority of cases?

To this I must answer, no! and it is because the case about to be cited strongly supports another view of the subject that I have ventured to bring it before you. There is a group of writers who still adhere to the old view that puerperal eclampsia is essentially toxic in its origin. While the renal incompetence due to a parenchymatous nephritis is of course a matter of great importance, the essential element of the disease is to be regarded as a toxæmia which itself is the cause of the nephritis, and which may become so intense that even normal kidneys may not be able to eliminate the poison with rapidity enough to prevent grave results.

In 1847 Virchow pointed out that changes were found both in the liver and the spleen in women who died of puerperal eclampsia, and expressed the opinion that attention had been devoted too exclusively to the kidneys in the study of this affection.* This suggestion has been greatly elaborated by Rivière, the experiments of Bouchard forming the basis of his theory.† Bouchard has discovered two convulsion-producing ingredients in the normal urine, one an organic substance which he has not been able to completely isolate, the other potassium and its salts. The proportion of the convulsants present in the urine of the same individual differs very much according to his varying states of health. Toxic matters are introduced into the body with the food. They are produced in the body by intestinal decomposition, by the organs

* "Gesamm. Abhandlungen," p. 778.

† "Pathogénie et Traitement de l'Auto-intoxication éclamptique," 1888.

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of secretion (the bile especially being very toxic if not properly disposed of), by the processes of disassimilation. The system is protected from the poisons absorbed from the intestinal tract by the liver, which has experimentally been proved capable of destroying toxic alkaloids, and by the fæcal evacuations. In the pregnant woman disturbances of digestion tend to increase the amount of toxic matter capable of absorption, while the constipation commonly present, the interference with the respiratory apparatus, and the unfavorable conditions in which the kidneys are called upon to do an unusual amount of work, all tend to interfere with prompt elimination. But, above all, the fatty degeneration of the liver prevents it from perfectly fulfilling its function of converting noxious matters into less harmful forms. Hence it may happen that the patient may be overwhelmed by an excess of poison before the kidneys have been appreciably irritated. This, in brief, is Rivière's auto-intoxication theory, and it is one that is held in one form or another by probably the majority of writers.

The hepatic lesions which act a prominent part according to this theory have recently been studied with care by Pillier* in eleven cases. He states that these livers varied from a bright yellow to a gutta-percha color. The liver cells were sometimes fatty, sometimes the seat of necrotic changes similar to those found in infectious diseases. The more or less numerous spots commonly seen and regarded as ecchymoses, he found to consist, in the earlier stage, of dilatation of interlobular capillaries. Later a necrotic focus appears in the centre, and later still this necrotic portion is separated as a sequestrum by round-cell infiltration at its periphery. The theories of causation of the hepatic lesions are, 1st, the microbic; 2d, that they are due to poison generated by the patients themselves (Rivière), or to chloroform—this latter supposition being disproved by the fact that they have been

* Gaz. hebdom., 1890, p. 361.

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found when chloroform has not been used; and 3d, mechanical—due to injury to the liver during labor. One author only, as far as I know, has found a microbe to explain the disease.* As his investigations were based only on examination of the urine, they must be regarded as entirely inconclusive, as the presence of a microbe in the bladder of a woman does not prove that it exists anywhere else in her body.

Another recent contribution of interest and probable importance in connection with these hepatic lesions is that of Virchow.† In five cases of puerperal eclampsia he found more or less extensive fatty embolism in the lungs and in the renal vessels—chiefly confined in the latter to the glomeruli. Most of these cases died with marked obstruction of the pulmonary circulation. No cerebral emboli were found. The kidneys were not much changed, the cortex being anæmic, the pyramids relatively red, the epithelium of the convoluted tubes cloudy. With these changes, the ones ordinarily found in eclampsia, he did not think the fatty embolism had anything to do. The source of the embolism he did not know. It might be the pelvic fat, in all the cases some laceration of the vagina or vaginal outlet existing. It might be the liver, fat being forced into the hepatic veins by the traumatism inflicted on that organ during convulsions and labor. The embolism did not have any causal connection with the eclampsia, but in a weak person he thought slight fatty embolism of the lungs might be enough to cause pulmonary œdema and death.

In a case seen by the writer, while in coma from which she never recovered, following a single convulsion, the thought occurred to him that the patient's condition might in part be due to the falling back of the tongue into the pharynx, and on subsequent reflection he regretted not having made a more persistent effort to re-

* Blanc: Archives de Tocologie, 1889, p. 282.
† Berlin. klin. Wochenschr., 1886, xxiii., p. 30.

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lieve this possible source of danger. Virchow's observation, and this possibility, are instances of factors affecting the respiratory apparatus which might well explain differences in the condition of the brain after death.

In closing this portion of my paper I cannot refrain from briefly calling attention to the analogy which exists between the malady which we are discussing and some forms of chronic renal disease. It has occurred probably to most of us to see cases in which vascular disease or general disturbance of nutrition has been very much out of proportion to any demonstrable insufficiency of the kidneys, but in which the renal lesions and other symptoms seem to be due to a common cause. Senator says that the renal lesions in Bright's disease "have, as is now generally recognized, their origin frequently, if not always, in an abnormal condition of the blood in the most general sense—*i.e.*, in an acute or chronic dyscrasia due to faulty mixing of the normal constituents, or to the addition of foreign and toxic substances." *

Renal diseases associated with infectious processes are due directly or indirectly to the action of infecting organisms. In other cases the morbid blood state seems due to some disturbance of the organic functions of the body itself. There seems to be a fundamental fault of assimilation or metabolism back of the whole symptom-complex, differing, perhaps, in different cases, the exact nature of which is almost wholly unknown notwithstanding the numerous hypotheses concerning it. The process back of many cases of cirrhotic kidney we call gout and know something about. That some similar process is back of other forms of kidney lesion involving primarily the renal parenchyma seems probable. It may be that the faulty metabolism in these cases differs from that in the malady we are considering only in being less intense in its action and depending on more permanent exciting causes. Some years ago I attended, toward the end of her life, a

* "Die Albuminurie," etc., p. 108.

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lady suffering from chronic nephritis with cardiac complications, whose kidneys were first known to be disordered twenty-five years before, during pregnancy. It seems plausible to assume that this individual had a tendency to some form of the faulty metabolism which probably lies back of renal disease, which is not due to irritants introduced from without, which was called into activity at one time by pregnancy, later by other exciting cause or causes. This may, in general, be the explanation of the not very rare cases in which chronic nephritis is said to have followed renal trouble first occurring in pregnancy.

Having thus passed in review the known facts and theories relating to the morbid conditions under discussion, I will now give a history of the case the observation of which led me to present the subject for discussion.

The patient in question had been under my professional care, for occasional slight ailments, for some years before marriage. She suffered from slight irritability of the bladder for years, for which I was not able to find any cause. Her general health had been excellent. Her first pregnancy extended from August, 1887, till May 23d, 1888. Albumin was first found in her urine March 17th, nine weeks and a half before delivery; the quantity varied very much, fifty-seven per cent of deposit being the largest amount; it disappearing entirely for a week in the early part of April. On six occasions the quantity of urea passed in twenty-four hours was estimated as follows:

March 18th. 700 c.c.; specific gravity, 1.026; alkaline; albumin, about sixteen per cent; urea, 20.3 grammes. Patient was taking four-drop doses of a two-per-cent solution of nitro-glycerin, which caused some headache. Suffered from slight nausea and constipation.

March 20th. 420 c.c. (some lost with stool); specific gravity, 1.030; acid; albumin, eighteen per cent; urea, 9.66 grammes + (what was lost with stool). Patient taking gtt. ij. of nitro-glycerin solution every three hours, and tincture of strophanthus, gtt. x. t. i. d. Feeling subjectively cool.

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March 22d. 580 c.c. (some lost with stool); specific gravity, 1.016; acid; albumin, 57; urea, 11.89 grammes+ (what was lost with stool). Patient comfortable. Taking strophanthus and nitro-glycerin as above, the latter increased to 3 gtt. doses.

March 23d. Urine, about one pint; acid; albumin, 32; urea, about 12 grammes.

March 30th. Urine, one and a half pints; specific gravity, 1.017½; acid, clear with Tanret's test; showed a few flocculi on standing after being boiled and treated with nitric acid; urea, 13.48 grammes. Patient had been sitting up for three days, feeling well. Stopped nitro-glycerin and strophanthus. Gave citrate of potash, gr. xv. t. i. d.

Throughout the next month the patient was comfortable, the nitro-glycerin and strophanthus being resumed, alternating with the citrate of potash. Three weeks before delivery she suffered from much backache, with pains shooting into left groin. This was lessened by the citrate of potash, and very greatly helped by salol, gr. x. t. i. d., given through a druggist's error in place of betol. The urine became black very soon under its influence, but no marked effect on the albuminuria was produced. It was noted that the urine was much less turbid than it had been before its use.

On the morning before delivery one and one-quarter quarts of urine were recorded as having been passed in twenty-four hours, containing no albumin. The delivery was uneventful, a healthy boy being born. No urine was secreted for twelve hours after delivery, as determined by the catheter. Five weeks after delivery the urine was found to be free from albumin; specific gravity, 1.018. Repeated examinations failed to show any casts in the urine, which was always turbid and showed rather more pus than the customary vaginal discharge would account for. Spots before eyes, œdema of feet and legs, slight headache, and general malaise were the symptoms most complained of. Sphygmographic tracings showed a very

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high tension pulse, except on one occasion when she had felt faint after a dose of nitro-glycerin. The tracing was taken two hours after the dose, a period of time in which usually all effect of the drug, on other occasions, was found to have disappeared.

After a period of twenty-one months, during which her health had been good, patient again became pregnant in February, 1890. Nothing abnormal occurred, except a slight attack of sciatica, until August 16th, about the end of the sixth month of pregnancy, when she lost consciousness suddenly for a short time without apparent cause, being at the time away from the city. Soon after she began to suffer from headache, spots before the eyes, and some pains shooting from the loin downward and forward, as in previous pregnancy. The urine on July 21st showed a specific gravity of 1.010; acid; no albumin. When examined after her return to the city, on September 2d, albumin was found; milk diet, confinement to bed, and hot baths were given.

September 4th. Given nitro-glycerin (two-per-cent solution), gtt. ij. every three hours. Milk not being well borne, diet changed to cereals, fruit, and vegetables, with small allowance of meat once daily.

September 6th. Feeling comfortable. Allowed to get up. Nitro-glycerin continued.

Urine for last twenty-four hours, 790 c.c. (26.7 ounces); specific gravity, 1.020; acid; faint trace of albumin; urea, 12.64 grammes. For two weeks the patient remained feeling well. On the 17th the urinary examination showed 44 ounces for twenty-four hours; specific gravity, 1.013; acid; albumin, trace on boiling, adding nitric acid, and allowing it to stand for several hours. On the morning of the 20th the urine was recorded as showing 36 ounces secreted in twenty-four hours; specific gravity, 1.016; acid; no albumin. She awoke not feeling well, having been tired by a ride on the previous day, but without any local symptoms. She remained in her room all day until evening, then going down to dinner. While at the table,

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a few moments after a dose of nitro-glycerin, she felt faint, lost consciousness, and had a clonic spasm during which she bit her tongue. The next day she was feeling some malaise and muscular soreness. The urine, examined sixteen hours after the attack, showed a specific gravity of 1.012; no albumin by Heller's test, and only a faint opacity on standing after being boiled and acidulated with nitric acid. She was kept in bed and tincture of digitalis added to the nitro-glycerin, which was still continued. The following day (the 22d) the urine contained sixteen per cent of albumin. She had shooting pains in the left groin, aching in small of back on left side, nausea during pain. No headache. Slight veil before eyes. Feet not swollen since treatment commenced. To-day mentions that she had suffered from a peculiar nervous feeling behind her knees and a tendency to twitch for some months. Salol, gr. x. t. i. d., added to the nitro-glycerin and digitalis.

September 24th. Salol reduced to gr. v. t. i. d., on account of carboluria. In afternoon suffered from sharp twinges in the bladder, for which spiritus ætheris nitrosi was given with atropia gr. $\frac{1}{150}$, in addition to the above, under which the vesical symptoms subsided.

For three successive days at this period the urea passed was estimated as follows: urine of 24th to 25th, 27 ounces (798.5 c.c.); specific gravity, 1.016; acid; albumin, 0.03; urea, 8.778 grammes. 25th to 26th, 42 ounces (1,272 c.c.); specific gravity, 1.008; acid; albumin, 0.075; urea, 8.694. 26th to 27th, 25 ounces + (some lost with stool); specific gravity, 1.020; acid; albumin, 0.10; urea, 11.18.

On the 27th patient very comfortable. Salol was stopped and nitro-glycerin solution gtt. ij. given every three hours; tincture of digitalis gtt. x., and spiritus ætheris nitrosi ʒ i., t. i. d., continued. Urine of September 28th to 29th showed 40 ounces (1,183 c.c.) quantity; specific gravity, 1.015; albumin, 0.02; urea, 13.57 grammes.

October 5th to 6th. Urine, 58 ounces (1,715 c.c.);

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specific gravity, 1.012; acid; no albumin; urea, 15.437 grammes. The albumin had disappeared on the 2d, Heller's test being relied on, and did not reappear until the 18th, the urine varying in the meantime from 42 to 66 ounces under the influence of the nitro-glycerin, digitalis, and sweet spirits of nitre. The patient during this time was sitting up and comfortable, complaining, however, of sight so dim that she could not see to read with comfort, and nervous feeling in her legs.

October 18th. Ophthalmoscopic examination negative. Tired feeling in back and pain in left groin. Urine, 18th to 19th, 42 ounces (1,242 c.c.); specific gravity, 1.013; acid; albumin, 3.726 grammes (Esbarle's method); urea, 13.63 grammes. Patient noticed that when nitro-glycerin was given, even in a dose of one drop of the two-per-cent solution, at the same time with the spirits of nitre and digitalis, disagreeable throbbing sensations were felt all over the body lasting half an hour, no such prolonged effect following two drops of the nitro-glycerin solution when given alone. On this account only half a drop was given when its administration happened to coincide with that of the other drugs. Increase of the spiritus ætheris nitrosi to one drachm every three hours, and a short confinement to bed, were followed by disappearance of pain and albumin, none of the latter being present from October 21st to November 1st, the urine varying in quantity from 24 ounces (one day only) to 44 ounces, the specific gravity remaining somewhat low for the quantity passed.

November 1st. Had passed 40 ounces (1,330.77 c.c.) of acid urine, containing albumin one-half gramme to the 1,000, and 14.185 grammes of urea. October 30th to 31st, only 24 ounces of urine had been passed, apparently because a new specimen of nitre was not as strong as one previously used. Face and hands were slightly puffy, and feet were swollen. Spirits of nitre, one and one-half drachms t. i. d., digitalis and nitro-glycerin as before. From this date to her delivery on November 15th the

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urine fluctuated from 36 to 48 ounces, sometimes free from albumin according to Heller's test, sometimes containing a little.

On November 24th 45 ounces (1,330.17 c.c.) were passed; specific gravity, 0.014⅓; acid; albumin, none by Heller's test—two per cent on standing when tested by heat and nitric acid; urea, 13.97 grammes.

A healthy nine and three-quarter pound boy was born; painful cramps in the right thigh, rendering chloroform necessary toward the last, being the only complication. Presentation L. O. P. No urine was passed for eighteen hours after delivery; an attempt made with the catheter by the nurse after twelve hours showed the bladder to be empty. All drugs were stopped except spirits of nitre. Three days after delivery, when large quantities of urine were being passed, 3.2 grammes of albumin per 1,000 were found. Its absence was not again noted until eleven days after delivery, and the quantities were much more than accidental contamination by the lochia would account for (0.5 to 4.3 grammes per 1,000).

December 5th. Urine fell off in quantity after an attack of indigestion, and albumin, 3 grammes per 1,000, was found. None was ever found again after the 13th. The confinement was followed by a prolonged subacute cystitis which had probably antedated it. Repeated microscopic examinations, made before and after delivery, showed pus, more than could be accounted for by vaginal discharge, and often a little blood which may have come from hæmorrhoids, but no casts. The urine was always turbid when it reached me. On reviewing the case I was led to conclude that the cystitis had existed in a mild form during, and probably before, pregnancy, being of a variety which, I believe, is caused by slight vesical atony and spontaneous bacterial infection of the bladder.* Inasmuch as the urine did not contain albumin after delivery, at times when the patient was suffering considerably

* New York Medical Record, May 22d, 1891.

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from her bladder, and as much pus as had ever been noted in it was present, the complicating cystitis was probably responsible only for the vesical pain suffered by the patient and some of the pus found in the urine. The pain in the loin and groin suggested a possible pyelitis, but such pains have been noticed in other cases of the renal disease of pregnancy.

On December 14th to 15th, one month after delivery, the urine was found to be as follows: Quantity, 1,300 c.c. (43.95 ounces); specific gravity, 1.018; albumin, none (Heller); urea, 24.7 grammes; no diuretic being taken.

March 26th to 27th. Urine, 1,125 c.c. (38 ounces) + some lost estimated at 10 ounces; specific gravity, 1.021½; alkaline; urea, 19.125 grammes + that of the quantity lost.

April 14th to 15th, 1891. Quantity, 1,355 c.c. (48.04 ounces); specific gravity, 1.014¼; strongly alkaline; no albumin; urea, 18.2925 grammes. In this latter specimen some of the urea had probably been lost by decomposition before examination. The patient's vision cleared up steadily after confinement, and she is now in fair health except from some residual vesical trouble.

On looking for the cause of the disease in this case, I think it evident that the only purely mechanical factor which, in the above review, was found to have any foundation on observed facts, viz., compression of the ureters, can be excluded because the kidneys throughout reacted readily to diuretics, the absence of mechanical obstruction to the discharge of urine being thus proven, and because the constitutional symptoms of the case were most marked long before labor, which is the time when this factor, if present, is apt to be most prominent. For a similar reason the reflex theory is inapplicable. The one undoubted eclamptic seizure which the patient had occurred almost two months before labor, with no obvious reflex cause. This was all the more striking because the patient suffered from sciatica during pregnancy, and during her second pregnancy suffered extremely from

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pressure upon the sacral plexus. Wernicke* called attention to a group of cases in which he regarded eclampsia as being due to the establishment of an epileptogenous zone caused by pressure upon the sacral plexus. Here we had such pressure symptoms, but no coincidence between pressure symptoms and eclampsia and other nervous phenomena.

We are forced, finally, to consider the applicability of some form of the toxæmic theory in explanation of the case, and the question arises, were the various nervous symptoms noted due to a primary nephritis, with secondary toxæmia due to insufficiency of the kidneys? The freedom of the patient, before, after, and during the earlier portion of both pregnancies, from any symptoms or indications, from the examination of the urine, of chronic kidney disease; the facts that casts were never present, that the amount of albumin when present was usually small, and that the kidneys always readily reacted to a comparatively feeble diuretic, all go to show that the renal involvement was never very extensive. It is, however, to the condition of affairs immediately preceding and following the one undoubted eclamptic seizure that I especially call attention. During the ten days prior to this seizure the urine had been examined four times, its quantity varying from 34 to 44 ounces. On two of these occasions a faint cloudiness was noted on standing after boiling and acidulating with nitric acid; on all, Heller's test gave only a negative result. The urine measured for twenty-four hours, up to a time within ten hours of the seizure, showed 36 ounces, a specific gravity of 1.016, acid, and contained no albumin. Here was no evidence whatever of renal disease or renal insufficiency, yet a distinct convulsion occurs without obvious external exciting cause, and preceded only by a feeling of malaise, attributed to having been overtired on the day previous. The urine passed about sixteen hours after the attack

* Berliner klin. Wochenschr., 1872, No. 43.

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was found to be slightly opaque on standing, after being boiled and acidulated with nitric acid; Heller's test was negative. The second day after the attack the urine contained a deposit of sixteen per cent of albumin; on the third day, twenty-four per cent; the albumin again disappearing temporarily on the twelfth day following the convulsion.

Throughout the last three months of this pregnancy, even when the patient was passing large amounts of urine of fair specific gravity, amounting on some days to over sixty ounces, and often free from albumin, the obscureness of vision never left her, and ill-defined nervous symptoms developed whenever the stenosis lessened from any cause. The whole impression of the case was that of a toxæmia, back and wholly independent of renal lesion or insufficiency. Before discussing the nature of this toxæmia I wish to call attention to details of the albuminuria following the convulsion. Convulsions themselves have, by not a few writers, been regarded as the cause of albuminuria following them, and even of actual nephritis. If we turn now to Huppert's* observations in regard to albuminuria after epilepsy, we find that it was most marked in the urine secreted during the attack—*i.e.*, not necessarily in the urine passed immediately after a convulsion, as that may have been previously secreted. The amount in the great majority of cases was so small that it could be recognized only as a slight opacity after boiling and acidulating with nitric acid and allowing the urine to stand for some hours. The failure of other observers to find albuminuria after convulsions he attributed to their not employing sufficiently delicate tests. Larger amounts of albumin, and even hyaline casts, rarely with blood or epithelium on them, were found after groups of fits in epileptics frequently affected. The casts were usually found only in urine passed about three-quarters of an hour after an attack.

* Virchow's Archiv, Bd. lix., Heft 3, 4.

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Now, in the case under discussion albuminuria followed the convulsion, but the first urine examined after its occurrence, containing only a trace on standing, was passed sixteen hours after the convulsion, larger quantities being found later. Had there been no knowledge of a preceding albuminuria, the fact of a gradual increase in that symptom for several days would have been enough to have negatived the idea of the convulsion as a cause of the albuminuria, the albuminuria due to convulsions being, as above stated, greatest immediately after the fit and disappearing in a few hours. That convulsions can give rise to actual nephritis is a wholly unproved assertion.

To return to the question of the nature of the autotoxæmia in this case. I wish now to point out the bearing of the excretion of urea on the point at issue. On every occasion but one the amount was much below normal. Urea may fail to appear in the urine in normal amount, either because it is not formed in normal quantity or because the kidneys are insufficient. During the first pregnancy six estimates of the quantity passed in twenty-four hours were made, the hypobromite of soda test with the apparatus devised by Dr. C. A. Doremus being used. On one occasion 20.3 grammes were found, a quantity possibly not abnormal. The other five varied from 9.66 grammes + a little lost with stool, to 13.48 grammes. On all these occasions the urine was considerably below normal in quantity and contained varying percentages of albumin. It might well be questioned, therefore, whether or not the failure to excrete a normal amount of urea may not in this sense have been due to renal insufficiency. The same may be said of other similar cases that I have found reported by Bartels* and Herman.† In the second pregnancy it was otherwise; nine observations were made, the urea excreted varying from 8.69 grammes to

* Ziemssen's "Handbuch."

† Transactions of the Obstetrical Society of London, 1887, British Medical Journal, 1890, p. 130.

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15.43 grammes. In six of these the quantity of urine was forty ounces or over. In one there was no albumin in the urine—an occasion on which fifty-eight ounces were passed in twenty-four hours, containing 15.43 grammes of urea; in none was it large. The smallest amount of urea excreted in this group was 8.69 grammes. The inference may, I think, be fairly drawn that the amount of urine being normal or above normal, and there being, as above stated, no proof of serious lesion of the kidneys, the excretion of urea was abnormally small because only an abnormally small quantity was formed in the body.

This inference cannot of course be considered as proven in the absence of analysis of the blood. The observation of Semmola,* however, that in chronic Bright's disease less urea is found than normally—*i.e.*, that not only is less urea eliminated by the kidneys, but in patients not in an uræmic condition less is found in the blood—adds plausibility to my interpretation of the facts above given.

In my case the lesion present was almost certainly a minor grade of the parenchymatous degeneration characteristic of the renal disease of pregnancy. The comparatively trifling amount and frequent absence of albumin in the urine were, therefore, more indicative of a correspondingly slight renal lesion than would have been the case had it been a question of a chronic process largely interstitial. Parenchymatous nephritis pretty certainly does not occur without albuminuria. A possible weak point of the case is that the specific gravity of the urine remained slightly below what it normally should have been for the quantity passed; but that the failure of urea, one of the most soluble urinary constituents, to pass through substantially normal kidneys, was the cause of this does not seem probable. On looking for the cause of this probable diminished formation of urea, allowance must of course be made for the restriction

* Quoted by Delafield, Sajous' Annual, 1888, i., p. 480.

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as to albuminous food, meat being allowed only at one meal. As the patient ate fairly well throughout her sickness, this limitation was pretty certainly not the cause of a diminution in quantity of urea varying from a little over one-quarter to about two-thirds of what may be assumed to be the normal amount for this person, based on the amount passed after recovery.* One observer estimates that pregnant women eliminate from thirty to thirty-five grammes of urea in place of twenty-two to twenty-four; but Kleinwächter found the amount of urea in one hundred and seventy-nine examinations of lying-in women very nearly normal. The supposition, therefore, seems allowable that the nitrogenous waste of this patient was not being as completely converted into urea as it should have been, but that it circulated through the body in forms which have been proved by modern research to be decidedly toxic.

In a second case of my own about ten grammes of urea were found when the patient was passing about one and a half pints of urine containing albumin and casts, mostly hyaline. After the urine had been increased in quantity under acetate of potash, digitalis, and nitro-glycerin, the headache and nervous symptoms passed away. Two examinations of the urine then resulted as follows: Quantity in twenty-four hours, 1,340 c.c.; specific gravity, 1.014; alkaline; albumin, 1.3 grammes per 1,000; urea, 12.06 grammes. Quantity in twenty-four hours, 1,650 c.c.; specific gravity, 1.014¼; albumin, 1.2 grammes per 1,000; urea, 14.9 grammes.

This case unfortunately died shortly after a difficult forceps delivery, apparently from internal hæmorrhage starting in the left broad ligament. As far as it goes it sustains the views above advocated.

As it has been proven that in grave diseases of the liver the formation of urea is very much lessened, being completely abolished in acute yellow atrophy of that

* Quinquaud: "Essai sur le puerp. infectieux," 1892. (Quoted by Herman.)

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organ,* the probability of hepatic insufficiency being the important factor in the disease is evident. As to the causes of the hepatic changes, we may suppose them to be due to excessive work thrown on the organ from its having to act upon the waste of both mother and fœtus—though in this connection the fact that the fœtus also has a liver ought not to be forgotten—to circulatory disturbances, or to those combined with an abnormal vulnerability of the organ; but these are mere suppositions. The fact remains that the liver presents pathological changes. The bearing of the views and observations above given upon practice may be briefly stated as follows:

The periodical examination of the urine for albumin, while important, may fail to give sufficiently early notice of coming danger. The necessity of reporting any of the various nervous symptoms which might be due to toxæmia should be impressed upon some reliable person associated with the patient, as the subjects of this form of disease are apt to be apathetic about their own condition. The estimation of the amount of urea being passed is probably a more valuable index of the real danger of the patient than the presence or estimate of the quantity of albumin in the urine. The necessity of limiting the amount of nitrogenous food, when an exclusive milk diet is not tolerated, and the possibility of limiting by intestinal antisepsis the amount of poison generated, are the only points of treatment not currently recognized in the text books which this view of the subject brings forward. It is obvious that elimination can be more successfully effected if the disease is recognized before the kidneys are damaged.

DISCUSSION.

DR. H. C. COE thought that it was impossible to reconcile the various phenomena of the albuminuria and eclampsia of pregnancy with a single theory. Looking at the question from the standpoint of the general practi-

* Murchison: "Functional Derangements of the Liver."

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tioner, it seemed evident that there must be different forms of albuminuria. While there were some cases of eclampsia and albuminuria which might be explained on the basis of a toxæmia, in others there was chronic disease of the kidneys which had not been suspected before. He had in mind particularly pyelitis. In one case he found chronic pyelitis caused by pressure on the ureter, and he had seen several others, in one of which the eclampsia proved fatal. For this reason he felt that the theory of mechanical obstruction could not be entirely set aside. With regard to the temperament of the patient, he thought that the neurotic were most likely to have eclampsia. Young unmarried girls entering the Maternity Hospital suffered more or less mental distress, were apprehensive, and were more likely to have eclampsia, looking at the subject from the view of a reflex condition, than were other patients. The author had referred to the sudden appearance and disappearance of a large amount of albumin from the urine without apparent cause, and those who had had experience in maternity hospitals must have seen cases in which, without warning, eclampsia had developed, and then albumin was noticed for the first time. He had been accustomed to place more stress upon marked diminution in the amount of urine passed as a warning symptom than on any other. In Dr. Van Santvoord's case he thought that the radiating pains down the groin, etc., made it not improbable that pressure had a good deal to do with the condition, and asked if it was not possible that pyelitis was present.

Dr. W. T. Lusk recalled the fact that when Braun's theory was propounded years ago—viz., that puerperal convulsions were due to kidney trouble—certain objections were offered, and those objections, he said, had not been answered unto this day. It had not been explained, for instance, why some patients had convulsions whose kidneys were known to be normal. Nor had it been explained why some persons having kidney disease went through pregnancy without having any convulsions. Again, there might be complete suppression of urine, a large amount of urea might circulate in the blood, and the patient might even die, yet have no convulsions. It seemed to him that Osthoff's theory offered a more satisfactory explanation of all the phenomena than any other. According to Osthoff, where a convulsion took place in connection with the sudden stoppage of urinary secretion

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during pregnancy, it was due to reflex influence. First, the exciting cause was contraction of the uterus; this in one case caused, through the sympathetic system, contraction of the arterioles in the kidneys and stoppage of urinary secretion; or the stimulus might be conducted directly to the medulla oblongata; or, again, through the vasomotor centres, cause contraction of the arterioles of the brain and produce anæmia. This theory would explain the cases in which the renal symptoms were prominent and those in which they were not; it would explain the condition of the pulse, the convulsions, and other phenomena. It did not deny the gravity of the suppression of the urinary secretion. Where the kidneys acted freely there was always reasonable hope of life. Dr. Lusk added that when convulsions developed, the important thing to do was to empty the uterus. Veratrum, chloral, etc., were only temporary expedients.

THE PRESIDENT said that in his experience with eclampsia and the albuminuria of pregnancy, which had been gained mostly some years ago, one fact had impressed him in particular, namely, that the danger to the patient depended upon the amount of arterial tension. If there were markedly high tension in connection with temporary or permanent presence of albumin in the urine during pregnancy, it seemed to him always an indication of very grave danger. He had noticed that in chronic disease of the kidneys with albuminuria it was patients who had low arterial tension who passed through pregnancy in safety. Now, there were so many other conditions in which high arterial tension was present without evidence of renal disease, that we must look for other conditions than faulty urinary elimination as the cause. It was worthy of remark that in certain people there were conditions which would produce high arterial tension which would not produce it in others. For instance, one man might eat a hearty meal, take with it a stimulant, and experience afterward no arterial tension, while another man partaking of the same meal and the same wines would have high arterial tension. Of these two men, continuing in this course, one would have his life cut short, while the former might continue to live to a good age. It was a physiological condition which impressed on one individual the possibility of high arterial tension from a cause which would not produce it in another. It seemed, therefore,

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that eclampsia could not be explained solely upon the basis of renal disease.

DR. VAN SANTVOORD reviewed some of the facts in his case in support of the explanation which he had offered, which he thought would hold good even if pyelitis were present in one kidney, as he suspected it might be. Regarding high arterial tension, all writers had looked upon it as an important factor in these cases, some explaining it on the basis of a toxæmia, others on that of reflex influence.

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Stated Meeting, October 1st, 1891.

THE ENLARGED PROSTATE AND ITS OPERATIVE RELIEF.

By E. L. KEYES, M.D.,
NEW YORK.

MR. PRESIDENT AND FELLOWS OF THE ACADEMY:—Surgical progress has moderated, and, we may hope, eventually will do away with, that reign of terror which has been so long maintained by the enlarged prostate—a reign truly of terror for the sufferer, who could look forward to no final relief except that offered him by the scythe of the grim reaper, and a reign of hopeless, helpless incompetency for the surgeon as far as affording radical relief was concerned.

There is no ancient history of prostatotomy or prostatectomy. The very names are of modern coinage, and the acts they represent have only become justifiable surgical procedures within the last few years. The only notable recent literary productions that I need refer to are the several articles in the London weekly medical journals, which have appeared from time to time, detailing cases and operative methods at the hands of A. F. McGill, of Leeds, whose recent death we all deplore, and to whose investigations and successful operations modern prostatectomy owes its first serious real impetus in England and in this country; to the thorough pathological study of Watson,* of Boston, whose theoretical conclusions, however, have since been modified by practical

* "Operative Treatment of the Hypertrophied Prostate." Boston, 1888.

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experience; and to the admirable *résumé* of the whole subject, a year ago, at the hands of Belfield,* of Chicago, who succeeded in collecting a table of operations, at the hands of various surgeons at home and abroad, representing one hundred and thirty-three cases, in forty-one of which the prostate was attacked by the perineal route, and in the remainder by suprapubic incision. Lists of cases and single experiences are constantly appearing in the journals, sometimes containing valuable hints; but historically I think Belfield's essay covers the ground, and its appearance less than a year ago renders any new attempt in this direction at my hands a work of supererogation.

It need only be recalled briefly that, up to a few years ago, the prostate had no surgery except the surgery of emergency. Its abscesses were opened; its stones were removed, when detected; it was cut through when the bladder imperiously called for drainage—but this was about all.

Certain enthusiasts and visionary therapeutists, from time to time, then began to appear, advocating possible absorption of the enlarged prostate by the internal use of ergot or interstitial injections of ergotin, its shrinkage by electricity, electrolysis, electro-puncture, or, more notably, the internal electro-prostatotomy of Bottini, who still advocates and practises the method, claiming, up to December, 1890,† fifty-seven cases with two deaths, thirty-two cases improved, twelve no benefit. This method is doubtless better than the blind internal median prostatectomy as accomplished by Mercier's emport-pièce, an operation which Gouley, of New York, has unsuccessfully attempted to reintroduce. Then Reginald Harrison, of London, thought he could postpone the evil day and retard the results of enlarged prostate by pressure systematically

* "Operations on the Enlarged Prostate," American Journal of the Medical Sciences, November, 1890.

† Edinburgh Medical Journal, March, 1891.

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applied through the urethra with long, olivary, soft bougies. And again another suggestion of Harrison's, puncture of a large prostatic lobe through the perineum, and the tying-in of a solid tube for a long period, was hopefully referred to as a method of producing absorption. Yet none of these resources have gained permanent foothold in the profession.

Meantime at various hands progress was being made. The advantages of vesical drainage in advanced cystitis, advocated and introduced by Willard Parker, of this city, led to a number of operations on old men. A prostatic bar was often cut down, or a big lobe incised, at first without particular design, then as distinctly advocated by Harrison, for the purpose of introducing a tube much larger than the one commonly employed, and for the express purpose of straightening the prostatic canal and lowering its floor. In lateral perineal lithotomy also, long years ago, cases were reported in which the surgeon's forceps accidentally brought away, along with the stone, a large middle lobe, or his finger enucleated out of the lateral incision an interstitial fibromyoma; and after these operations it is narrated how, to the delight of the sufferer and surprise of the surgeon, the patient, perhaps for years before dependent upon the catheter, had suddenly again become capable in his urinary function and had so remained.

Yet these latter accomplishments were accidents and did not constitute a surgical method, but out of them undoubtedly arose prostatotomy and prostatectomy—at first perineal, and later, after Peterson had revived the suprapubic route, by the more rational approach above the pubic symphysis, where the eye can see and the hand perform much more capable work than through the bloody and straightened perineal channel.

To-day prostatotomy and prostatectomy are accomplished surgical facts and splendid additions to our resources in that class of grave vesical disorders found so often in the best ranks of the community, late in life, in

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those who use their brains rather than their muscles and lead sedentary lives.

Yet the indications for these operations are not yet fixed, although Belfield's analysis of his tables, and McGill's generalizations, have advanced the decision.

The questions on which I shall ask for discussion tonight, giving of course my own impression after narrating my cases and personal experience, are: 1. When is perineal prostatectomy to be preferred to the suprapubic operation? 2. What condition of prostatic or vesical disease, or both, justifies radical operation, and should it be done early or late? 3. How much of the prostate should be taken away?

Prostatotomy, as an adjunct to vesical drainage, has been so generally recognized as a proper concomitant of the latter operation that its consideration need not detain us; nor need we consider that new form of operation, lateral prostatectomy, performed by dissecting off the rectum from the prostate and peripherally slicing away its lateral lobes without opening either the urethra or bladder. This operation was suggested theoretically, after cadaveric research, by Dittel last year; but, aside from its manifest inability to cope with median prostatic overgrowth, it has been tried and found wanting this year by Küster,* who reports three successful cases, stating that the operative manœuvre was not difficult, the patients were contented with the operative effect and could urinate at will, but that in each case a small urinary perineal fistula was left behind. My cases, eleven in number, three perineal and eight suprapubic, are briefly as follows:

PERINEAL CASES. CASE I.—X——, aged fifty-four. Uses catheter every two or three hours and relies upon it; has practically done so for several years; median hypertrophy suspected; stone found. Perineal incision, April, 1874. Phosphatic stone removed; small third lobe twisted

* Münchener med. Woch., April 14th, 1891.

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off. Voluntary urination returned and remained until death, several years later.

CASE II.—X——, aged sixty-five. Painful and very frequent urination night and day. Catheter finds residual urine, but its use fails to afford relief to the straining and dribbling, which is almost incessant. In February, 1883, perineal incision and forcible removal by twisting of an outstanding section of the right lateral lobe as large as the last joint of the thumb, weighing eighty grains. Much relief followed, but no cure. Intervals increased to between three and four hours, night and day. Bladder does not empty itself entirely. Patient is a drinker.

CASE III.—X——, aged sixty-six. Recurrent violent hæmaturia; moderate peripheral prostatic enlargement, a little residual urine, prostatic bar; blood demonstrated by examination to come from the prostate and just in front of it. Perineal section in June, 1891; third lobe upon the bar incised in V-shape and twisted away. Its weight is thirty-four grains. Result, September, 1891: Health and strength excellent. Urination free. No recurrence of hæmaturia.

These three cases, and another under my charge, in which, however, my assistant, Dr. Fuller, did the operating, all recovered and were successful in securing relief of pain and freedom of urination—in Case I. voluntary urination until he died, several years later; in Case II., where the catheter had been solely relied upon for four years; a cure of persistently recurring profuse hæmorrhage in Case III.; and the right of way to voluntary urination in Dr. Fuller's case. My reasons for selecting the perineal route were, in the first two, non-acquaintance with the suprapubic method at the time. Had I the cases to-day I should attack both of them above the bone. In the third case the old gentleman was feeble, bled profusely, and I believed I had to do only with moderate peripheral hypertrophy and a granulating bleeding bar, from which I expected to take a V-shaped piece. I found a small projective lobe along with the bar, and removed the lobe by the V-shaped incision. In the fourth case there was perineal stricture as a complication, and the entire operation was done through the perineum.

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The perineal operation, it seems to me in looking back over the cases, is suitable for election only under three circumstances: 1. Great feebleness of the patient, where the main indication is to get drainage and save life, and in which the prostate is not very hard and not very large in its lateral lobes. Here drainage can be well borne, as a rule, through the perineum, and with a moderately long finger a projecting lobe, median or lateral, may be made out, unless the patient be fat and the perineum deep. When such lobe can be located with a Blizzard knife inserted flat upon the finger, a converging incision into the prostatic substance may be made in V-shape on each side of the offending projection, and then the latter may be wrenched away with long-curved forceps.

This was the method I adopted in two cases. In the other I simply twisted off a largish pedunculated third lobe. All the patients were thin and their bladders easily reached by the finger through the perineal incision.

I think in future, in any similar cases, I shall pass a double-woven silk ligature over the projections by means of the long-curved dressing forceps with holes drilled near the tips of the blades, which I have had made for this purpose, but have thus far only used through an incision above the bone. I believe that with such an instrument, after a V-shaped incision had been made, including the offending lobe, or even a V-shaped piece of the bar, a double silk ligature could be placed and a small écraseur worked, with the forceps still holding the ligature in place, until the latter had embedded itself well into the prostatic tissues; then the dressing forceps and écraseur could be removed and the latter reapplied upon the same ligature, held in place by their embedment; and I think that such a method of removal will be better than the rougher tearing-out process that must otherwise be resorted to in order to get the V-shaped segment away. Such tearing brings away sometimes too much tissue, as a long, unnecessary strip of mucous membrane.

The V-shaped incision cannot be very accurately made

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at the bottom of the perineal wound. It cannot in any hands be accurately carried to a point, and some tearing is necessary.

I used this forceps to apply ligature in my third suprapubic case. It worked admirably, except that one of the silk strands gave way. The fibrous enclosing membrane, and I judge sometimes also the prostatic substance, is too hard to be cut through by silk, and I intend trying flexible steel wire through the perforated forceps upon my next case.

Deep prostates and very large, hard lateral lobes, if the prostatic tissue be very dense, as it may well be, are not suitable sometimes even for simple drainage, prostatotomy, or much less prostatectomy by the perineal route. I have seen the tube partly collapsed or even squeezed out by the clasping action of two large-sized lateral lobes. These cases, I believe, should be approached—even if it be only for simple drainage, the patient's condition precluding more radical measures—they should be approached, I repeat, by the suprapubic and not the perineal route.

SUPRAPUBIC PROSTATECTOMIES. CASE I. X——, aged sixty-five. Condition deplorable; constant pain; urination at intervals of two hours day and night; urine full of blood, albumin, and casts. Vesical atony with five ounces residual urine; both lateral lobes large and hard, small lateral internal projecting lobe; small phosphatic stone. Operation September 15th, 1890. Stone removed and small projecting lateral growth snipped away with curved scissors. Attempt was then made to enucleate the large lateral lobes with the finger, but it was impossible. Neither the finger nor the curved scissors could make the least impression on the dense fibrous mass. The finger was passed under the mucous membrane of the prostatic sinus, and externally under the prostatic fibrous sheath, but by no effort could any portion of the dense mass be loosened or torn away. I then thought of the rongeur, and always carried it afterward; but I did not have one with me, and was therefore obliged simply to cut away the soft mucous covering surrounding the vesical orifice,

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and to mince the edges and bar between the lobes by repeated rappings with the scissors points. The operation was therefore technically unsatisfactory, in that the dense large lobes were left about as big as before the operation.

Result, a year later, September, 1891: Voluntary urination without pain, vast improvement in general health, catheter never necessary: this doubtless due to the removal of the outstanding lobe. But the five ounces atony persists as before and makes urination frequent, unless the catheter be used occasionally to drain away the residuum. In short, the patient is like many another with atony who has never been operated on. The misfortune here is that, not having a rongeur, I could not take out enough of the bar or of the dense lateral lobes to do the operation properly.

CASE II.—X——, aged seventy. Relies entirely upon catheter, which has frequently to be passed, but the passage is attended by difficulty and pain. He had been divulsed about a year before, and an enormous sound introduced, without advantage, by his physician. No chill or disturbance followed this operation. The cystoscope showed a small third lobe. The urine was clear, no blood, no pus, no albumin, no casts, and an operation was urgently demanded on account of local distress. I cut this gentleman in March, 1891, and pinched off his small third lobe with the rongeur.

Result.—Half an hour after the operation he had a chill, and practically a total suppression, from which he never rallied. I consider that the result was one of those unusual cases of pernicious urinary fever. It was, of all the prostatectomies I have done, the most trifling in extent, and the result was more unexpected than if it had occurred in any of the other cases.

CASE III.—X——, aged sixty-six. Atony; eight ounces of residual urine. Patient not dependent on catheter, but not at all relieved by it. Urinates every two hours by day, and twice at night. Prostatic sinus in free suppuration. Prostate peripherally large and possessed of a third lobe as big as a plum. All local measures unavailing. Moderate local hæmorrhages occur constantly; life intolerable, and operation demanded.

April 16th, 1891, I cut this gentleman and removed his third lobe with the wire écraseur. I then snipped away the collar-like, bulging, urethral prostatic orifice, and with

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the finger easily broke down the soft prostate, shelling out two hundred and forty-nine grains of prostatic substance and a number of rounded, distinct fibromyomata, one of which was polypoid and was scraped out of the prostatic sinus, being soft and easily removed by the finger nail. I had no occasion to use the rongeur.

Result.—In three weeks the patient was up, with the wound healed, and he left his house on the twenty-third day.

Examined in September, 1891. He is perfectly well, except for a trace of pus still in the first urinary gush, but disappearing. He empties his bladder in a full stream at an interval of between three and four hours. His atony has disappeared, for a catheter passed after voluntary urination gets nothing.

CASE IV.—X——, aged fifty-nine. Has a large stone and median hypertrophy; relies on the catheter, which he passes sometimes hourly, then at longer intervals. Has been an invalid about four years, the last one being passed in bed. Urine like bean soup, thick with pus, containing blood, casts, and albumin without stint. The patient was ready to die, and accepted operation without a murmur.

I cut him early in July, 1891, and removed a stone as large as a hen's egg, weighing seven hundred and forty grains. The third lobe was as big as the last joint of the thumb. I placed a double silk ligature over it with the dressing forceps having dulled ends, and snared it off. Then I cut out a deep piece from the place where the stump grew, lowering the prostatic outlet considerably. The bladder was sacculated greatly.

This patient recovered promptly, and now has given up the catheter, urinates in a full stream, holds his urine from five to seven hours, and is a well man. He has gained fifty pounds in three months.

I operated on this gentleman more out of compassion for his sufferings than in the hope of saving him. I feared urinary fever and suppression, and gave him, therefore, ten grains of diuretin every few hours after his operation. He had no chill, no suppression—a result so agreeable and so striking that I could not but attach some possible influence for good to the diuretin. I have used it in every major operation upon the bladder or urethra since this case, twelve in number, and have never yet had a chill or

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suppression since I began to use it, three months ago, although some of my cases have been desperately severe; there have been six prostatectomies; one suprapubic lithotomy in a fat old man, an intense diabetic, who got well, although his heart failed and his liver stopped for several days after the operation, yet the urine welled up as limpid as a spring through it all; one suprapubic drainage for vesical cancer; three perineal urethrotomies with guide, and two very severe ones without guide; one litholapaxy. One case only died, my last prostatectomy, at the end of the second week, but he died by exhaustion, with a weak heart and an unhealthy wound. He had no urinary fever, and his kidneys did their work freely and uninterruptedly until his death.

CASE V.—X——, aged sixty-six. Catheter life for six years. When I saw him he was using it every two hours. He was wasted to a shadow, with eczematous eyes and pustules over his body; putrid urine full of casts, albumin, blood, and pus; no appetite, dry tongue; manifestly in septic depression. I washed and disinfected him, got him on milk diet, and did all I could, with little effect except in reducing his sepsis and curing his pustules, as well as sweetening the urine. He lost twenty pounds during the winter. I cut him above the bone, July 17th, 1891, and gave him plenty of diuretin, with salol, and constant vesical irrigation. I took out stones weighing sixty-three grains, and prostatic third lobe and bar weighing three hundred and seven grains. There was no bad symptom. Recovery was uninterrupted but slow. The patient is now in the country, and has not answered my letter asking about voluntary urination. His bladder was completely atonied, and I shall investigate this point with interest. Whether his voluntary urination returns or not, his life was unquestionably saved, and in a double sense, because when I hesitated to operate upon him he told me calmly that if I declined to help him he intended to resort to the Roman remedy.

CASE VI.—X——, aged sixty-five. Occasionally can urinate, but very often not at all; retention habitual and catheter constantly resorted to. Cannot sit for pain. His whole life is given up to efforts at urination; gets up every hour and a half at night. I cut this patient suprapubically

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on August 18th, 1891. I thought before operating that he had prostatic stone, because a finger in the rectum made out a projecting, very dense, hard lump bulging below his right prostatic lobe, and an acupressure needle passed into this lump through the rectum struck calcareous material. I found a small, horse-collar enlargement, with moderate bar and conical third lobe upon it. These I easily removed with scissors and rongeur. Then with the needle I demonstrated that the enlarged bulging right lobe was partly degenerated in a calcareous way—gritting as the needle entered it in many places—but that there was no true prostatic stone. I easily tore away with the finger and nipped away with the rongeur about half of this right lobe, until I passed beyond the lateral bulge which it made within the prostatic sinus. The material removed weighs one hundred and sixteen grains. This patient was a little burned by using water too hot for the purpose to avert hæmorrhages, and his recovery was retarded thereby, but he had no bad symptoms except loss of appetite and depression. The wound is not quite closed yet, although the patient has returned to his home in a neighboring city. Whether he can dispense with the catheter, therefore, I cannot now decide.

CASE VII.—X——, aged 60. In constant pain; urinates every two hours a day, four times at night. Has a minute calculus in the prostatic sinus. This I detected with the soft catheter while testing for atony, and I pushed it backward into the bladder. I then searched with metal searcher and failed to detect the calculus. After the search, which showed third lobe and bar, so much disturbance followed that I determined to cut at once, which I did August 31st, above the bone, finding a gr. v. calculus, a prostatic bar, and large bulging lateral lobes, with collar-like vesical orifice—weight sixty-three grains.

In this case there was a little after-inflammation of the space of Rhetzius, due to the use of a deep suture in the second week to draw the granulating surfaces together. The patient went home in his fourth week, but as the wound is still open I cannot report on the power of the bladder to empty itself absolutely.*

CASE VIII.—X——, aged 61. In serious trouble; for eight years dependent on the catheter night and day; condition deplorable; constant pain and distress. This

* Both these patients reported October 25th. Both empty the bladder entirely, and are practically sound and free from pain.

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gentleman I cut September 10th, removing four hundred and sixty-seven grains of stone and one hundred and thirty-nine of prostate. He acted badly under the chloroform, which had to be used sparingly. He had no chill or suppression, no urinary fever or pyelitis, but his pulse intermitted greatly after the operation; he got hiccough at once, and obstinate constipation; his wound became and remained gray, never granulating; his temperature went up, then small, shreddy sloughs appeared in the wound; his tongue became dry, his heart faltered, and he died on the fifteenth day.

Results.—Out of my eight suprapubic cases two died, one a most promising case, the last a very grave one. After Case II. all took diuretin freely, and salol, and in no case was there urinary fever, suppression, or pyelitis. Antiseptic irrigation and the usual precautions were always followed. In age the patients averaged sixty-four. The cases were not selected, except that all mild cases were refused operation and no desperate case was denied the chance, and of these several were so nearly dead when taken in hand that the operation seemed more like the short horn of a dilemma than an operation of choice or expediency. Suprapubic prostatectomy upon cases of this nature is of the first order in magnitude and gravity. In my opinion it far outranks nephrotomy, or even nephrectomy, in gravity. Even in the milder (seemingly milder) cases it is a grave resource, as my second case demonstrates; and I cannot agree with Belfield that it is proper to attack cases early, when their symptoms are not grave, with an operation the best statistics of which yield a mortality of $13\frac{6}{10}$ per cent—McGill's statistics, twenty-four cases, show a mortality of sixteen per cent—when the well-known chances of life with use of the catheter are so high, and when cases are on record like the German who lived forty-five years urinating only through a catheter, and Thompson's case of many thousands of insertions. I have had a case of twenty years' duration; and, when the catheter is well borne, an individual using it is not much worse off than a patient with hernia, who has to wear a truss. To suggest to such a patient an operation in his

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early career, with a mortality of, at the very best, one in eight, is like offering to kill a mosquito on a man's nose with a club. It is correct so far as the mosquito is concerned, but may be disastrous otherwise.

As to the power of restoring its contractility to an atonied organ, my statistics lack value on account of the recent date of several of my operations. I should not have read this paper until a year from now, except on account of your President's solicitations.

Belfield's tables make, in eighty-eight cases, twenty-nine, or one-third, restored to voluntary urination. Of these twenty-six were cases in which there was also calculus. In my eight suprapubic cases two died; in three of the others, although all are up and out, the wound is not quite healed; of the three remaining, Case I. was sufficiently operated on and his atony remains, although urination is natural and voluntary up to that point. Case III. had eight ounces of residuum, and now empties his bladder completely. Case IV. also has entirely dispensed with the catheter and is functionally well.

Whether the others will lose their atony and empty their bladders entirely without catheter I cannot now say. Of my three perineal cases, two emptied their bladders entirely after operation, one did not. Dr. Fuller's case still has the perineal wound.

Varieties in Prostatic Texture.—An important lesson taught by my cases is the variety in texture of the enlarged prostate. McGill states, and all operators advise, that the curved scissors be used first and then the prostate be dug out with the finger. Acting on this I operated imperfectly on my first case. Scissors would not cut it, except to cut away the projecting lobe. I loosened around it, but could not possibly dig out a shred with the finger or any instrument I had, so hard and tough was the prostatic substance. This suggested to me the rongeur, and with it I had great comfort. I am having some instruments constructed to cut out pieces of varying size and width; until now I have nipped and twisted away

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pieces with an ordinary rongeur, or crushed them with its cutting edge and then removed them with curved scissors.

Many prostates are soft and may be easily gouged out with the finger, both the soft ones, those containing interstitial tumors like Case III., and the very hard, calcified ones like Case VI. This could be torn easily by the finger into pieces of suitable size for removal.

The outstanding lobes can be removed with the wire or double silk snare (except that the enclosing membrane is sometimes tough and breaks the silk), or with galvanocautery or the tonsillotome, as Weir has suggested.

Salol and diuretin are the only medicines I use, with milk diet and Poland water. I have long since given up quinine in urethral and bladder surgery.

Hot-water irrigation sometimes stops hæmorrhage, sometimes not. In the latter instance iodoform gauze may be stuffed down into the wound, or drawn like a big rosette into the urethro-vesical orifice upon a doubled silk thread passed through the urethra and knotted over a pad at the meatus.

I have not used Albarran's tubes, but with their use the bladder might be packed antiseptically and treated like an outside wound. Albarran and Lluria,* at the Society of Biology, July 4th, 1891, report the successful experimenting of this retained urethral catheter upon a dog, and give Guyon's case of the young woman who wore them satisfactorily, after suprapubic section, for four days. The catheters are of soft rubber, made by Mathieu, and have a soft elastic bulb at the extremity, which expands within the ureter—after introduction upon a stylet—and thus retains the tube.

Poirier, at this meeting, objected to injection of the ureters on the ground that substances so thrown in reached the renal vein without rupture of kidney tissue.

I prefer the vertical to the transverse incision always, and in this operation, which yields so much hæmorrhage,

* La Médecine Moderne, July 9th, 1891.

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I prefer the open dressing. My method is to use one or two buried catgut sutures to attach the recti muscles, the yellow fat below the peritoneum, and the bladder wall above its incision into one finely knotted mass, then to carry one end of the silk loop, on each side, that has been supporting the bladder during the operation, through the rectus on either side, and again to knot it, and then tie the two loops together, under considerable tension, with a string passed across the sacrum, so as to hold the loops between the pelvic crest and the great trochanter on either side. This loop goes in over the skin through the rectus, through the bladder, thence up over the skin on either side, and the tension of the two keeps the wound constantly open. Continuous irrigation with hot boracic fluid may then be easily maintained night and day by means of an elevated jar of fluid and siphon tube.

In final dressing, after some days, I find great advantage in keeping the patient dry by the use of the flat abdominal sponge constantly changed.

Amount of Tissue to be Removed.—A point that remains is the extent of tissue that should be removed. Belfield cites the notable failures that have occurred in his own and other hands in accomplishing the result aimed at, namely, voluntary urination—and perhaps also cure of atony may be added as an aim—on account of the physical impossibility of getting out a hard obstructive growth or interstitial tumor not infrequently found growing in the floor of the prostatic sinus, and not to be reached by the finger, or, as he thinks, in any way except by a combined perineal incision. I believe that with the rongeur or a similar instrument this objection no longer holds. The main object of the operation is to cut away the bar and depress the bladder opening into the prostate, so that the bas-fond may drain, and there may be no longer a suppurating pouch left the shut-in prostatic sinus.

This lowering of the vesical outlet and picking out hard growths in the floor or sides of the prostatic sinus

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can be perfectly well done with the rongeur, but not with any other instrument yet in use. If all such obstacles are thoroughly done away with, the bladder outlet properly lowered, and the gross posterior bulk of the lateral lobes removed, I think it better for chances of life, and as good for chances of urination, to leave the greater anterior part of the prostate unmolested; and this can all be done above the pubis without any extra perineal incision.

The quantity of tissue removed, however, does not seem to influence mortality. In my most rapidly fatal case a piece as big as a pea was removed. My greatest amount was three hundred and seven grains, in Case V., and recovery was uninterrupted, although the case was desperate and one of long standing.

The three greatest amounts removed that I know of are four ounces, by Buckston Brown, in a man aged eighty-seven, who recovered, and something over two ounces each in two cases by McGill, one of which died.

The only argument in favor of early operation is that the longer the patients have suffered the greater seems to be the mortality, as J. William White, of Philadelphia, has emphasized; but this was to be expected, as such patients are older and more broken in every respect.

My conclusions are:

1. Prostatectomy is justifiable, and does what nothing else can.

2. The perineal operation is moderately less severe but decidedly less reliable than the suprapubic; it should rarely be preferred, unless there be urethral complications. In very feeble men it may still be elected.

3. The operation is not justifiable, with present statistics, if the patient can be comfortable in catheter life.

4. No physical condition of the parts or of the patient, short of a practically moribund state, contra-indicates operation. By it in desperate cases life is often actually saved, although the operation is a grave one and its mortality high.

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5. With the rongeur—better than any instrument—the bladder outlet can be lowered, and polypoid or interstitial growths jutting into the prostatic sinus can be removed, and these points are more essential to a successful operation than is the taking away of a large portion of the prostatic bulk. The instrument next in value is the curved scissors, but the skilled finger is most important of all. Most of the work has to be done by the aid of touch, as the bleeding soon becomes free and renders visual inspection impossible.

6. Diuretin, perhaps, is of value when the kidneys are damaged. It certainly does no harm.

7. Chloroform alone, in my opinion, should be used as an anæsthetic for the kidneys' sake.

DISCUSSION.

DR. L. B. BANGS said he had many times asked himself the question whether he ought to propose to his patients, old men, an operation on the prostate with the hope of obtaining relief from many troublesome symptoms which successful prostatotomy often gave, and he had answered in the negative; that he would attempt to make them comfortable by other measures, because of the risks and death rate of operative procedures. Still, there were cases which required an operation, and the indications for the one or the other method had been well pointed out by Dr. Keyes. He thought, however, that further consideration would have to be given the question whether cases should not be operated upon earlier. The period at which the operation was undertaken would probably have some influence on the mortality. He, too, appreciated the valuable remarks of the author on the technique of the operation.

DR. J. A. WYETH had operated only by the suprapubic method. He made a vertical incision, very seldom a cross incision, over the pubic arch. He agreed with the author as to the uselessness of perineal drainage; and said that, in the twenty-four cases upon which he had operated, he had employed siphon drainage, with entire satisfaction after he had learned how properly to use it. In preparing the patient he made it a rule to sterilize the urine by administering five or six drops of the oil of gaultheria several times a day for two days.

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Dr. Wyeth could not understand why Dr. Keyes should now pass to the use of chloroform, an anæsthetic which the English were only just discarding to such an extent for the use of ether, the latter having been the favorite agent in America for so many years. It was not until recently that he had learned how to use ether in a way to get the maximum benefit out of the least quantity. No one, he thought, would discard it for chloroform, except in special conditions, after having once employed the Armstrong inhaler.

He thought suprapubic prostatotomy was not so dangerous as the paper would lead one to think. The danger arose from the condition the patient was in rather than from the operation. But even in almost moribund subjects it offered a chance of restoring the patient to health, as in one instance which he mentioned, that of a man who had been confined in bed for two years.

DR. KEYES said, as to the question why he used chloroform, it was because in so many of these cases there was a pathological change which had extended to the kidney. Although the bladder walls might be thick, apparently hypertrophied, it was not a compensating but a degenerative process. Chloroform was safer not only because less injurious to the kidneys, but also on account of the liability of ether to set up a bronchitis or pneumonia in this class of subjects.

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Stated Meeting, October 15th, 1891.*

DISCUSSION ON THE MEDICAL AND SURGICAL TREATMENT OF EPILEPSY.

WHAT CAN WE EXPECT FROM THE SURGICAL TREATMENT OF EPILEPSY?

By B. SACHS, M.D.,

PROFESSOR OF MENTAL AND NERVOUS DISEASES IN THE NEW YORK POLYCLINIC.

THE treatment of so grave a disorder as epilepsy is a subject which may well claim the attention of all medical men. The disease is a veritable scourge that leaves its indelible mark upon the victim, often attacking him at an early age, unfitting him for the serious work of life, and blighting all the hopes dependent upon him. In view of the importance of the subject, it need not surprise us that it has come up for discussion so frequently before our learned societies; and no apology is needed, I believe, for continuing before this Academy a discussion which was conducted most ably only a few weeks ago before the American Surgical and Neurological Associations at Washington.

The brilliant achievements of American and European surgeons have given us the utmost confidence in the possibilities of cerebral surgery, and, with the increasing knowledge of neurologists in localizing accurately the site of disease in the brain, there would seem to be no good reason why the results in cerebral surgery should not equal those in abdominal surgery. But, unfortu-

* In charge of Section on Neurology.

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nately for the patient and for us, the complicated structure of the brain makes cerebral disease a very different affair from disease in or around the abdominal viscera. Sufficient allowance is not, as a rule, made for this difference, whence it follows that in the case of the surgical treatment of epilepsy much has been expected and but little has been realized. It seems wise to me, therefore, before we allow our hopes undue scope, that we should stop to inquire what we can expect from the surgical treatment of epilepsy.

To those who have not acquainted themselves with the literature of the subject a simple answer may occur. They may say: "Take the recorded cases, note the results, and make your inferences." But in the case of the surgical treatment of epilepsy statistics are useless. A few successful cases have been reported, and even these with undue haste. Von Bergmann * and the latest author, Sahli,† have given up the attempt to tabulate the results of operations upon epileptic patients. I started out on the same path a few months ago, but soon found it would be love's labor lost. In this matter of the cure of epilepsy after operation, the memory of medical men is not as reliable as it fortunately is with regard to most other diseases. A distinguished surgeon stated recently before one association that he knew of a case of traumatic epilepsy in which the cure was of ten years' duration, and before another society, a few days later, that the longest cure he knew of was of three years' duration. But what of the innumerable failures? They have not been reported with the same candor and promptness with which most men have heralded their short-lived successes. And if the attacks are inhibited for a number of weeks or months, is even this temporary success to be put to the credit of the operation? As long ago as 1875 Maclaren‡ insisted that epileptics were improved by any

* "Die chirurgische Behandlung von Hirnkrankheiten." Berlin, 1889.

† Volkmann's Samml. klin. Vortr., Vortr. No. 28. N. F., 1891.

‡ Edinburgh Medical Journal, January, 1875.

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operation, whether it be for cancer of the pelvic organs, for joint disease, or what not; and it is as likely as not that some of the supposed cures after ovariotomies may be accounted for in this way, though I am not willing to go to the extreme to which Dr. White,* of Philadelphia, has recently gone, in putting the improvement following trephining for traumatic epilepsy in the same category with the "curative effects of operations *per se*," simply because no gross organic changes were found in the organ so exposed.

I propose to answer the question embodied in the title of this paper by presenting to you the views I am forced to hold regarding the nature of the disorder which we attempt to cure, and by giving you the results of my own experience in the surgical treatment of epilepsy—an experience that I owe chiefly to the kind offices of Dr. Gerster and Dr. Wyeth, with whom I have been associated in fourteen cases of cerebral operation, ten of which were done for the relief of epilepsy.

Let me remind you that epilepsy is a symptom, not a disease; that it is often merely one of a number of symptoms pointing to organic disease of the brain—to tumor, hæmorrhage, abscess, or widespread meningitis and sclerosis. In other cases it is a direct or remote effect of traumatic injuries to the skull or brain. In addition to these we have cases of genuine epilepsy, so called. Some one has suggested that it would be better to call them cases of epilepsy from unknown cause, and our modesty should, I think, incline us to this latter view. For one, I find that I see relatively fewer cases of genuine epilepsy than I did in former years. On closer examination I have not infrequently found that the epilepsy had taken its start from a long-forgotten injury or accident; that it was in its earlier days associated with paralysis, the paralysis having left but the slightest traces, while the epilepsy has remained distinctly enough. Nor is it to be

* "The Supposed Curative Effect of Operations per se," Annals of Surgery, August and September, 1891.

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supposed that a true epilepsy—I do not mean single convulsive seizures—is a functional disease. In our ignorance we may call it so, but with the improved methods of examining cortical tissue I am confident that we shall before long be able to demonstrate its anatomical substratum. Two French authors have been leading the way in this inquiry. Marie,* who goes to the extreme of denying hereditary epilepsy, claims that children may be born epileptics, but they have not been conceived as such. By which he implies that, as in the case of congenital cerebral palsies, some slight lesion has been established during the intra-uterine period; that this lesion may be lost sight of, but the secondary degeneration following upon it is the cause of this supposed hereditary epilepsy. Féré† has furnished strong evidence in favor of this view. He induced Chaslin‡ to examine five brains taken from epileptic subjects; in all of these brains the most careful microscopical examination revealed an increase of neuroglia tissue, with the formation of small fibrils emanating from the spider cells of the neuroglia. Chaslin infers that this is a sort of gliomatous sclerosis, and that this sclerosis is to be found in epileptic brains of entirely normal macroscopical appearance.

I have led you into this discussion of the anatomy of so-called genuine epilepsy in order to have you associate in your minds the idea of secondary sclerosis of the cortex with epilepsy. This secondary sclerosis is the pivot upon which the entire question turns. I repeat that in cases of idiopathic epilepsy the initial causal lesion has not yet been determined; idiopathic cases have by common consent not been considered proper cases for operation; but we have learned to operate in cases of localized epilepsy—Jacksonian epilepsy—due to focal disease, whether of traumatic origin or not, and in these cases the focus of disease is present, and so is the secondary sclerosis. If

* Progrès médical, 1887, No. 44.

† "Les épilepsies et les épileptiques," Paris, 1890.

‡ Semaine médical, 1889.

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years pass by before death ensues, the focal disease may be beyond recognition, but the secondary sclerosis can be and has been recognized. In early childhood the cortex suffers focal injuries which might well be called traumatic, if they were due to an external force; but, whatever the cause may have been, we have a meningeal hæmorrhage often enough; the clot resting upon the cortex may be absorbed, but it has given rise to a local change which extends by degrees until it finally leads to secondary changes in the form of a lobar sclerosis. Paralysis and epilepsy are the chief symptoms of this condition. Instead of a meningeal hæmorrhage due to difficulty during labor, imagine a traumatic hæmorrhage; disregard the etiological differences, and the two accidents will result in the same processes.

Let us push the argument one step further. Every one is familiar with the fact that the convulsive seizure of a localized type is due to an irritative lesion of the motor or sensory centres. The most familiar cases of localized epilepsy are those due to discharging lesions in the motor areas. It is well known, too, that convulsive movements of a thumb or an arm point to a discharging lesion in the centre or centres representing these parts. Those parts only are capable of a discharging lesion which are not actually destroyed; if destroyed, we have absolute paralysis and not localized convulsive seizures. Does the diseased area contain within itself the irritating power, or is this irritation conveyed to it from other parts? As a tumor grows near a centre, it irritates that centre and causes convulsive seizures; as soon as it has displaced or destroyed the centre, the formerly convulsed part becomes paralyzed. The injuries and morbid processes with which we are here concerned rarely lead to the destruction of a centre; it is capable of discharging, and the irritation it needs seems to me to be supplied by that secondary sclerosis of which it—the focal injury—has been the prime cause. Is there any clinical evidence that the secondary sclerosis plays this part? I shall be very much mistaken

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if it does not explain the very curious fact that in traumatic injuries and in the cortical diseases of early childhood the epilepsy does not, as a rule, develop for months and even years after the focal lesion has been established. It takes months, and even years, until a large amount of sclerosis is established. It is fortunate that focal injuries are not invariably followed by sclerosis; why it should develop in some cases and not in others it is difficult to say; the severity of the lesion is not the sole determining factor.

Some may maintain that, while this reasoning may apply to epilepsy following organic diseases, the sclerosis has not been actually demonstrated in cases of traumatic injuries. The fault is with the investigator. Bergmann* reports the case of a man who had received a gunshot wound of the left parietal bone in 1870; he was operated upon and bone was removed. Two years later he had the first epileptic attack. These attacks continued for fourteen years; then Bergmann trephined over the scar. The patient did well for one month; after that he fell into the status epilepticus, in which he died. The author assures us that the wound had healed perfectly, and that the cortex and dura were entirely normal—macroscopically, it may be, but no microscopical examination was made. Inasmuch as some of the cases to be operated upon hereafter may die, it will be well to make a most careful histological examination of the cortex in such cases.

Returning to the practical bearing of these pathological studies, we infer that we have an initial focal lesion and a condition of secondary sclerosis to deal with. It is our plain duty, therefore, to prevent the development of secondary sclerosis if possible, or, if it has been developed, to neutralize its effects. The first part of our task is by far the more difficult. Not knowing as yet the exact conditions under which this sclerosis is developed, we can scarcely be expected to meet these conditions; but we can

* Loc. cit., p. 160, second edition.

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attempt to diminish the initial lesion and, if possible, to remove it. This is equivalent to a plea for early operations in traumatic and organic cases. How can we neutralize the effects of a well-established sclerosis? Shall we say by excising the diseased area? The method is rational enough, since we cannot rid the brain of the sclerosis.

This method of excision has been applied by Horsley,* Keen,† Bergmann, and others. The results have been satisfactory in some cases, disappointing in others. In spite of the removal of the centre, the sclerosis has exerted its power through other channels, through other irritable centres. If the diseased centre is the only irritable area, the result will probably be a good one; but we have no means of predicting whether or not this will be the case. And, to make matters worse, excision of a centre means loss of function. You may not cure the epilepsy, but you are very apt to paralyze the convulsed part. But this function of the excised part is very apt to be assumed by other parts of the brain, particularly in young persons; and among older persons the patient, if left to make his choice, will prefer a local paralysis to a severe epilepsy.

The practical conclusions to be drawn from the foregoing are these:

1. In a given case of traumatic or organic lesion, operate as early as possible, to prevent the development of secondary sclerosis.

2. If you have not operated at the outset, the onset of epilepsy is a warning that secondary sclerosis has been established; by operation at this time you may avoid an increase of the trouble.

3. Excision of the diseased area is the only rational operation; if all other centres are not in an irritable condition the operation may be thoroughly successful.

But if we cannot easily cure epilepsy we may improve

* British Medical Journal, April, 1887.

† American Journal of the Medical Sciences, October and November, 1888.

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the patient's condition by diminishing the number of attacks. What we can accomplish I propose to discuss in the second part of this paper. I refrain purposely from entering upon the subject of operative interference in cases of tumor or abscess of the brain, as the advisability of operating is governed by motives other than the cure of the epilepsy. Traumatic epilepsies will attract us first, and next I wish to enlist your interest in certain forms of epilepsy associated with infantile cerebral palsies. These latter diseases have been so generally overlooked that the epilepsy constituting one of the symptoms has rarely been recognized as a special form.

Traumatic cases call for immediate surgical interference. Whenever the skull has sustained a severe or even a moderate injury, a surgeon or the attending physician should do an exploratory operation, to make sure that there is no depression of bone. As trepanation is not a very dangerous operation, it would be better to do this than to have the slightest doubt. I was pleased to note that Dr. Agnew * insisted strongly on this point in his recent paper at Washington. Together with Dr. Wyeth I had the privilege of seeing, only a few weeks ago, a robust individual who had sustained a fracture of the skull by falling from his wagon; he was picked up in an unconscious condition, and, with the exception of an occasional lucid moment, remained in a condition of stupor up to the time of the operation. There was no paralysis and no focal symptom of any sort. Yet during the exploratory examination a large fracture was found which extended well back from the coronal to the lambdoidal sutures, and running for a part of its course along the sagittal suture. A trephine opening was made to see whether there was any splintering of the inner table, or whether the dura had been lacerated. As far as we could see, no severe injury had been inflicted; and the good, but slow, recovery which the patient has made may possibly have come about in this special case without any

* University Medical Magazine, 1891.

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operation. Yet these are the very cases which so often develop epilepsy from pressure of depressed bone; and it seems to me fully as important that the surgeon should operate early to determine whether there is a depression, as that he should defer operation until epileptic symptoms appear, which may place the case beyond the possibility of surgical relief.

After the epilepsy following traumatic injury of the skull or of the brain has been developed, there is still hope that the epilepsy may, in a few instances, be inhibited by surgical methods. For ages past trepanation has been the classical operation in these cases. Wherever depressed bone presses upon any part of the cortex, or an old scar acts as a source of irritation, the removal of such bone or scar is clearly indicated; in many cases improvement, if not a cure, of the condition follows. We must seek an explanation, however, for the improvement which follows trepanation in many cases of traumatic epilepsy of long standing in which there is no old scar and no marked depression of bone. We will not explain this on the theory that any or every operation helps; we know, however, that adhesions between the brain and its coverings are apt to be formed, and that traumatic cysts are very frequent. The trephine opening may therefore relieve the increased pressure due to these morbid conditions. It will be well to enlarge the trephine opening and to make it as ample as the conditions will permit. To show you how much or how little may be accomplished by mere trepanation, allow me to present the very condensed histories of a few cases of traumatic epilepsy. The full histories I hope to publish in due course of time, in conjunction with the surgeons who have done the operations.

CASE I.—Boy, aged sixteen years, from Madison, Wis.; no hereditary history. At the age of eighteen months fell out of a first-story window; since that time epileptic attacks of great severity, with occasional intervals of freedom from attacks. These generally begin in the right arm and extend to the leg and face; often they become

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general. Loss of consciousness in all attacks. I referred him to Dr. Gerster. Operated upon February 23d, 1891. The skull was trephined over the arm area, which was proved to have been exposed by the electric test; the trephine opening extended so as to expose the greater part of arm and leg centres. Attacks set in two days after the operation and have continued with old-time severity. Result, no improvement. The father would not consent to a second operation.

CASE II.—Young man, aged twenty years; works on his father's farm in New Jersey. At the age of twelve years was pushed backward over the pole of a wagon, striking, according to account, on the back of his head; was unconscious for a few minutes, but went to work. A week later the first general epileptic attacks; these attacks had recurred at varying intervals for two or three years. For the past three years the boy had attacks of typical Jacksonian epilepsy, in which the muscles about the right half of the mouth only were convulsed. I had occasion to see several such attacks. These minor attacks would occur many times a day. This series would be interrupted by an occasional severer attack of localized convulsions, ending up in general convulsions, loss of consciousness, etc. The boy, who is a fairly bright lad, desired the operation. This was done February 13th, 1891, by Dr. Gerster. As demonstrated by the faradic stimulation over the exposed area, the trephine opening had been laid exactly over the centre representing, according to Horsley,* the upper face and angle of the mouth. Adhesions were found under the button of bone which was removed. Good recovery, but attacks set in within a week after operation, and in these attacks the eyelids were convulsed, showing a slight extension of the focal lesion. A few weeks later the attacks were as of old in every respect. "No improvement whatever," so the boy reported to me eight months after the operation.

Somewhat better success has followed upon operation in two cases of sensory epilepsy of traumatic origin; as they are rare forms of epilepsy, I wish to refer to them briefly in this connection.

CASE III.—J. D., aged eight years. When seven months old fell upon the left side of the head; at eleven months began to have epileptic convulsions; twitchings

* American Journal of the Medical Sciences, 1887, vol. i.

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usually began in the right arm and leg, and the mouth would be drawn to the left side. After the age of five years these attacks disappeared. Since last March the boy has had similar attacks; but with the onset of these attacks it was noticed that the ear began to discharge. The convulsive attacks were regularly preceded by auræ, in which he would either perceive a very foul odor or else imagine a steam-car close upon him. He would close the window to keep out the noise, and at once fall into a convulsion. The attacks would be more frequent whenever the discharge from the ear ceased. About one such attack occurred every week before operation.

The mastoid region was not painful, but everything pointed to mastoid trouble, and hence I sent him to Dr. Gerster for operation. On August 14th Dr. Gerster chiselled through the mastoid process into the middle ear and removed several sequestra; no pus. The wound healed quickly. The boy has had but one attack in two months, and is far less irritable and brighter than before.* It is interesting to note that with the onset of this ear trouble the old epileptic tendency due to traumatism had been revived.

CASE IV.—A man, aged thirty years, of alcoholic habits, at the age of ten years was struck by a stone on the back and side of the head. Four years later he began to have general epileptic convulsions. These continued regularly; every two weeks he would have two or three attacks in a single day. Patient has become stupid and irritable; has left lateral hemianopsia. Operation, July 24th, by Dr. Gerster. Removal of occipital scar. External plate found to be depressed; this was removed with chisel. After dura was exposed and adhesions were cut away, the opening in the occipital bone was enlarged to the size of a silver dollar. The wound did well. Sixteen days after the operation three epileptic attacks occurred; they were followed by transitory delusions of persecution, from which he soon recovered. He was discharged on August 15th, and had no attack until October 1st after taking a large amount of liquor for the relief of pain. The result may be designated as a marked improvement. The hemianopsia has remained unaltered.

This is an epilepsy starting from one of the sensory

* A second operation was done about two months later, since which time the boy has been free from attacks.

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areas of the brain, but whether the patient actually had a visual aura he is too stupid to state.

Our own experience in this matter is not unlike that of other physicians. Horsley, Bergmann, Park, Keen, and others have not fared much better.

In the search after better methods, Horsley's suggestion, in case of focal lesion to remove the entire diseased centre, met with general favor. With the aid of our present methods of determining centres, and particularly if we allow the result of faradic stimulation of an exposed area to be our chief guide, we can very accurately determine the extent of the area to be removed, and I have satisfied myself that this can be done before the dura is opened. But, as I have intimated before, even the excision of diseased centres is not an unmixed good. First of all, it often fails. Attacks have returned after such operation in the cases of Bergmann, Park,* and Keen. In one of Park's cases the contents of the cyst were emptied, but the cyst was not removed. Horsley's first case has been the only very positive success, no attacks having occurred for twenty-two months after operation.†

Rational as this method seems to be, there are reasons for its failure. The entire centre may not have been removed; the paralysis of the convulsed part has been thought by Keen and others to be proof of the fact that the entire centre has been removed. Then, again, if an arm centre has been the actual focus of disease, the neighboring face or leg centre may, in the course of years, have attained a sufficient degree of irritability to become the discharging centre; and, furthermore, the existing sclerosis will help to advance this or other centres to the dignity of a discharging centre, if they have not already acquired this unfortunate function.

Another serious feature of this excision operation, and indeed of all cerebral operations, is the possibility that

* New York Medical Journal, November, 1888.

† I cannot find any later reference to this case. Other cases have been reported, but before a sufficient period of time had elapsed.

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the operation itself may lead to the formation of cicatricial tissue in or around the cortex, which may do more damage than the initial lesion. Yet, from what I have seen of the condition of brains years after an operation, I believe this danger from new cicatricial tissue to be quite slight.

Granting the entire success of the operation in question, you have at best in many cases substituted a paralysis for an epilepsy. In the case of an arm or face centre, most patients would consent and prefer the paralysis to their epileptic seizures. Few would care to have their leg centres excised, and to wait until some vicarious centre may give them power to walk; and I doubt whether in Case IV., which I reported above, the patient or my own conscience would have permitted me to remove one visual centre. Excision of a centre, while it promises relief in a few well-selected cases, is not so much of a divine inspiration as it appears to some to be. Let us prevent traumatic epilepsy as far as in our power lies; it will be easier to prevent it than to cure it.

I consider it my duty to call your attention to the epilepsy associated with the cerebral palsies of children. In a paper * published last year it was shown that forty-four per cent of all cases of infantile cerebral palsies develop epilepsy, and I have stated that there could be but little doubt that, of all cases of ordinary epilepsy, a very fair proportion were developed in connection with infantile palsies. This view has been accepted by later writers. I have seen at least half a dozen cases of epilepsy within the past year which were supposed to be cases of idiopathic epilepsy, but which, when examined carefully, revealed the traces of an old hemiplegia. Nor are the pathological conditions underlying these palsies properly recognized.

One case of Horsley's, a boy four years of age, with right hemiplegia, who had as many as thirteen or fourteen attacks per day, is a case in point. Dr. William A. Ham-

* Sachs and Peterson: Journal of Nervous and Mental Disease, May, 1890.

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mond * some time ago reported the case of a girl of twenty, afflicted with an old hemiplegia, in whose brain he found a large cyst which was evidently the leavings of a former hæmorrhage; and Case V. of Dr. Keen's † latest paper is not merely a case of defective development, but one of infantile cerebral hemiplegia with epilepsy and idiocy. I would not call attention to this class of cases if we did not find among them the only cases of non-traumatic epilepsy which demand surgical interference.

These palsies come on either in the intra-uterine period or early in life. The initial lesion in the acquired cases is generally a hæmorrhage, thrombosis, or embolism, and this focus of disease leads in many cases with rather surprising rapidity to the development of secondary sclerosis throughout the cortex. In fully ninety-five per cent of all these cases the lesion is in or upon the cortex. The lesion—a hæmorrhage or softening, say—is very apt to be strictly limited to one or more areas. It need not, therefore, surprise us that typical Jacksonian epilepsy is found in some of these cases, or that we find scars and cysts and sclerosis just as we do in the traumatic cases.

The three cases of this class which I shall refer to were operated upon during the past year—two of them by Dr. Wyeth and one by Dr. Gerster. The histories are briefly as follows:

CASE V.—L. C——, male, aged six years. Onset of disease at the age of five years with right hemiplegia and convulsions of a Jacksonian type, which have been repeated every week since, finally increasing to as many as five daily; athetoid movements of right hand; is irritable and bad-tempered. Operation was done December 28th, 1890. A large opening was made in the skull over the motor arm area of left hemisphere, and enlarged from this; adhesions to skull broken up. No attacks for six weeks after operation, and none for several months after leaving the hospital. I have not heard from the boy in fully three months.

CASE VI.—A girl, aged sixteen, who has had right

* New York Medical Journal, August, 1890.

† American Journal of the Medical Sciences, September, 1891.

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hemiplegia and epilepsy since early childhood; epileptic attacks very frequent and affecting paralyzed part exclusively. Dr. Wyeth operated upon the girl in the Polyclinic Hospital, exposing, by the method which I must leave to him to explain, the entire left motor area. In this area I determined by the use of the faradic current the exact arm centre. The dura was opened in semicircular fashion, but, as the entire area seemed normal, we did not at the time excise any part of it. The dura was closed, and the wound healed nicely; she was free from attacks for at least five months.

CASE VII. has been by far the most interesting.* I was asked by Dr. Wyeth to see A. H. G——, aged thirty-two, who had applied to him for the relief of his epilepsy. The history showed that the epilepsy had been developed at the age of two years, and that with the epilepsy a complete left hemiplegia appeared. On examining the patient this hemiplegia was evident enough, and this, taken in conjunction with the history of unilateral attacks, led me to look for a focal lesion—a hæmorrhage probably—which, from the nature of the attacks, I thought likely to be most marked in the arm centre. Dr. Wyeth trephined over this site, enlarged the opening, cut open the dura, and then exposed the discoloration and thickening of the pia, which was adherent to the cortex beneath. A number of incisions were made into the cortex at this point, breaking up old adhesions and lessening the increased tension at this point. The patient did well after the operation. On the second day the paretic arm was paralyzed, but after the lapse of a few days it was no worse than before the operation, while the epileptic convulsions, which had appeared at least once a week before the operation, did not occur until six months after the operation. The further course of this epilepsy will have to show whether any permanent improvement has been gained.

Simple trepanation seems to be more successful in these epilepsies associated with infantile cerebral palsies than in the traumatic forms, probably because of the still greater frequency of cysts in these diseases than in the traumatic epilepsies. The early recognition of these troubles is of great importance; and the question natu-

* This case has been referred to in the author's paper on the "Pathology of Infantile Cerebral Palsies," New York Medical Journal, May 2d, 1891.

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rally arises whether we can diagnosticate the lesion with sufficient accuracy to encourage the surgeon to operate at an early day before secondary degeneration is established. I believe this will be possible in many cases, but the disease sets in frequently at a very tender age at which cerebral operations are but poorly tolerated. Moreover, the epilepsy, although a probable sequel, is still a remote contingency; the paralysis represents the reality, and parents will be most apt to tell the physician to care for the present only, more particularly if looking to the future means a possible increase of the paralysis. As soon as epileptic symptoms appear the paralysis has the value of a focal symptom; the centres should be exposed, and, if not removed, they should at least be treated in accordance with the special indications of the case. In children excision of a centre is a less serious affair than in the adult, for in the former other parts of the cortex are capable to a greater degree of assuming the functions of the destroyed part. I am confident that, if these cases of infantile cerebral palsies are more generally recognized, and if we succeed in checking the tendency to epilepsy in them, the total number of epileptics will be noticeably diminished. If the surgical treatment of epilepsy be of any value at all, it is, in view of the foregoing, not to be restricted to the traumatic forms, but let it be applied also to those epilepsies which are associated with the cerebral palsies of childhood.

In conclusion, I would say that, under favorable conditions and by the methods described in this paper, the surgeon may be able to cure a few cases of epilepsy, he will be able to improve many, but surgeons and neurologists should in future make an earnest effort to *prevent* epilepsy.

The Medical Treatment of Epilepsy.

Dr. C. L. Dana said he would not speak of the treatment of epilepsy in the usual way, as this had been done very thoroughly by Dr. Seguin on a recent occasion; he

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would speak of the subject rather from the basis of diagnosis and prognosis. He regarded the larger proportion of cases of epilepsy as the expression of a degenerative disease. Idiopathic epilepsy was symptomatic, not of any special focal lesion or organic change, but expressive of a family or individual degenerative tendency. In the idiopathic cases would be found certain physical, physiological, and psychical marks by which one could recognize the intensity of this degenerative process. Therefore, before undertaking either medical or surgical treatment, one should make a most careful examination of the patient with a view to determining to what extent the stigmata of degeneration were present. In proportion to the intensity of these stigmata would treatment prove of little avail. Epileptics showed in varying degree the following signs of a degenerate tendency: want of robustness; asymmetry of the cranium, present in seventy per cent of the cases; the asymmetry was not usually very marked. In a certain proportion of cases there was shortening of the parietal arch; in another proportion, of the frontal arch, especially in *petit mal;* in women a high and protruding forehead was thought by Benedik to indicate, perhaps not epileptic tendency, but convulsive tendency. Further indications of the epileptic stigmata: the teeth badly set in the jaws; the palatal arch sharply arched in many cases; the face asymmetrical and uncultivated; in voluntary movements there was manifest unequal innervation; difference in the pupillary margins, astigmatism in many cases; deformity of the ears in many cases; low vital capacity; genital anomalies were common; peculiarities in the fingers and hands. The asymmetry of the head might show itself either in the cranium or face, or both; if in the face, it was usually of the upper portion.

Physiological Stigmata.—Among these facial twitchings, stammering, nystagmus, anomalies of the sexual instinct, irresistible impulses, the muscular power below normal, peculiarities in standing and gait, relatively less secretion of phosphoric acid compared with urea, often anæsthesia and defects of special senses.

Psychical Stigmata.—These, he said, were too well known to require more than mere mention. There was the tendency to mental aberration, moral depreciation, waywardness, lack of will power, sexual aberrations.

The question of continuance of medical treatment, or

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urging it, or of interfering surgically, would depend largely upon the intensity of these stigmata or evidences of degeneration. He believed there was only a minority of epileptics who should be kept upon bromides. He placed importance upon mental occupation, upon hygiene and diet, placing these above medical treatment. Baths and bromides constituted the main features of treatment in certain European institutions. If there was a sclerotic change, as seemed probable, it furnished a basis, he thought, for continuance of the old method of treatment by nitrate of silver and for the present use of arsenic. He thought a small amount of nitrate of silver and arsenic useful adjuncts to other treatment. He also gave some phosphoric acid at intervals between bromide treatment. Hydrate of chloral was a useful adjunct of bromides, and lately he had tried chloralamid with considerable satisfaction. Antipyrin might prove useful, and had been advocated by Dr. Wood. Bromide of gold acted only in improving nutrition and increasing the body weight. Bromide of camphor was of well-established value in *petit mal.* He had faith in the continued use of the galvanic current to the brain and neck, but time hardly permitted of its thorough application by the physician. There were many other drugs used more or less in epilepsy, but they were not of sufficient value to warrant taking up the time of the Society.

Dr. J. A. Wyeth said that the older he grew the more he became convinced of the value of co-operation between the medical and the surgical mind, especially in the field of brain surgery. His remarks referred mainly to the methods of exposing the brain in epilepsy. There were three, all of which were about equally good. The one was by trephining—taking out successive buttons of bone. This method had become popular; it permitted replacing the pieces. In the second method the bone was cut away, the particles being cast away, although they could be replaced. The third method he had made use of considerably the past year and a half. It consisted in making a large horseshoe-shaped incision down to the bone and through it, not dissecting the scalp off the bone. Thus a trap-door was made which was turned down over the face, exposing the dura. Owing to the line of incision through the bone having been somewhat large, an eighth to a quarter of an inch, union had been cicatricial, not bony; but he believed that with improved instru-

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ments he would be enabled to leave a separation of only one-sixteenth of an inch, and in that event bony union could be expected. In some of his cases there had been elevation of the bone flap. He believed there were more cases of epilepsy amenable to surgical treatment than physicians supposed. He thought that simple exposure of the brain could not be classed among serious operations.

DR. W. R. BIRDSALL said that while he was pleased to hear Dr. Wyeth's opinion as to the safety of operating in epilepsy, he yet could not forget the fact that cases did die as a result of an operation in the hands of those believed to be competent surgeons. Every now and then some defect in the antiseptic method, or other condition, was accountable for a death. In a case of brain tumor, for instance, the risk might well be taken. In one case he had advised rather against an operation, it being one of epilepsy developing recently, or about the twentieth year, in a girl who had a slight depression of the skull when six months of age. The convulsions became almost immediately general, and there was less development of the body on the side opposite the cranial lesion, leading him to believe there was cortical change and arrest of development of the motor areas, and that therefore an operation would probably prove useless. He thought it was too early to speak much for or against the operation. Evidently it was best to resort to it early, if it were indicated. Among drugs none equalled bromides. He did not think electricity was very promising. It was well to remember Esquirol's observation that a change in treatment was likely to result for a time in some improvement. Various surgical measures had been proposed and practised, such as blood-letting, tying the carotid, castration, etc. It was hard to say how much the improvement (temporary) was due to the change in treatment and to mental shock. This remark applied also to trephining, which was apt to diminish the attacks only for a time.

DR. M. A. STARR thought the mental effect of any new procedure in cases of epilepsy handicapped the proper estimation of its value. There was no field in which the physician could more appropriately show some wholesome scepticism. As bearing on this aspect of the case, he called attention to an article by Prof. White, of Philadelphia, upon the therapeutic effects of operations *per se*. It showed that many cases of epilepsy might be

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improved for a year or more by trephining, and then relapse. It appeared that the mental effect of any procedure in epilepsy was almost as important as in hysteria.

He fully approved of Dr. Sachs' statement that cases should be selected, and that operations should be limited to cases of traumatic epilepsy and those in which the brain lesion could be located, but the trouble was that ninety-nine cases out of a hundred were not traumatic. About ninety-nine cases out of a hundred were idiopathic, whose origin we knew nothing of.

He knew of two cases in which everything pointed to the propriety of an operation; the patients went into the operating room well, except for an occasional fit; they were operated upon by one of the ablest surgeons, in one of the best hospitals, and they died within five hours after the operation. The skull in these cases was found to be very thick.

Dr. Starr had had the supervision of an operation in three traumatic cases the past year, in which there was apparently a direct connection between the blow upon the head and the muscular spasm; the surgeons admitted the propriety of an operation, yet at the end of nineteen months in one, fifteen in another, fourteen in the other, no apparent good had come from the operation whatever. In one of the three there was evidence of old fracture beneath the incision. In one a depression outside, but none of the inner table. The brain was exposed in all. The improvement had been in all only temporary. He confessed to not having had enough courage to advise a surgeon to excise a part of the cortex of the brain. If sclerotic tissue was present and could not be seen, it probably did not equal that which would follow excision. Looking, therefore, at the future of the surgery of epilepsy, he thought there was not the brilliant prospect which there seemed to be two or three years ago. We would have to proceed with a great deal of care.

Regarding the medicinal treatment, he, of course, depended chiefly upon bromides; but he called attention to an article by Haig, published in *Brain* for June, on the influence of digestive processes upon the treatment of fits, in which the author claimed that, by observing the quantity of uric acid in the urine and blood, he could predict an attack of epilepsy in the epileptic, and on these studies he based the indications for diet, etc., by means

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of which he hoped to relieve the condition and obviate the attacks.

DR. E. D. FISHER said he had given considerable attention to epilepsy in cases associated with cerebral hemiplegia. Most of the cases had reached adult life, and he was unable to find much difference between the convulsions in these and in idiopathic cases; the convulsion began no more frequently on the paretic side. Perhaps it had been different in childhood.

As was well known, post-mortem examination showed atrophy of the convolutions in some cases, and he thought that if an operation had been performed early—say at the age of three or four years—this progressive atrophic change might have been checked, nutrition encouraged, and the embryonic cells enabled by the increased nutrition and education to take on more or less their normal function. This was important, not alone from the standpoint of overcoming the epilepsy, but also of improving the mental condition, which in these cases was well known to be impaired.

Dr. Fisher thought the defects or stigmata named by Dr. Dana did not belong to epileptics except those of the idiotic class. He had reached this conclusion after observation of many cases.

DR. G. M. HAMMOND, Chairman of the Section, spoke of mental shock or severe mental impressions as a cure for epilepsy, and especially for the prevention or abortion of attacks. In some institutions for epileptics, nurses and attendants employed this method whenever they saw an attack was imminent. They would shout at the patient, grasp him roughly, shake him violently, or even strike him a sudden, unexpected blow. He cited the case of a young man, who had been treated for a long time unsuccessfully at his own and at other clinics, who had now been for two years without a fit, following mental shock. He was walking under the elevated railroad one day when the cylinder head of an engine directly over him blew out with a loud report. He at once fell in a fit, but had never had one since. He also spoke of two patients who had come to his clinic for treatment for epilepsy who had been greatly benefited, and the attacks arrested for a long time, by means of hypnotic suggestion.

DR. SACHS said, in closing the discussion, that he could not agree with Dr. Starr as to the proportion of idiopathic cases. He did not believe it was anything like

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even ninety per cent. The closer the analysis of cases the smaller would be the number of idiopathic cases or of those in which there was no evident organic change.

Regarding the danger of an operation, he thought surgeons ought to be able to promise that the operation would not endanger life in adults. In children it was different, as they did not tolerate cerebral operations well. He had had four cases of microcephalus operated upon in children, and three had died. Those were the only deaths from cerebral operations which he had seen.

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Stated Meeting, November 5th, 1891.

MEMORIAL ADDRESS ON THE LIFE OF ABRAM DU BOIS, M.D.

By A. BRAYTON BALL, M.D.,

NEW YORK.

Mr. President and Fellows of the New York Academy of Medicine:—In accepting your invitation to prepare a memorial sketch of the life of Dr. Abram Du Bois, I was not unaware of the great difficulty of doing justice to it. A mere sketch, whether of a human face or of a human character, has its necessary limitations, and must always fail to satisfy the demands of friendship. A skilful artist, by a few strokes of his pencil or graving tool, may produce for us the face of a friend with much fidelity to nature. We recognize the general resemblance and even the stronger characteristic features; others may not see the deficiencies, but we miss the warm tones and softened details of expression, which are to us the great attraction in the face. And still more unsatisfactory must be any attempt to depict in outline a human character. The more marked and distinctive qualities, which engaged the world's attention, may be portrayed with a fair degree of faithfulness, but the man himself, as only his friends knew him, is largely lost in such a fragmentary representation.

Dr. Du Bois came of Walloon ancestry. He was a descendant in the sixth generation of Jacques Du Bois, who was born near La Bassée, in the province of Artois, now the French Department of Pas du Calais. Early in the seventeenth century Artois formed a part of the Walloon

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country, which embraced the present French Department du Nord and the southwestern provinces of Belgium. It was then under Austrian rule, but reverted to France in 1659 by the terms of the Peace of the Pyrenees. The Walloons were a brave, hardy, and industrious race, of French origin, and speaking the French language. They were the direct descendants of the Belgæ, whom Cæsar in his "Commentaries" praises as the bravest of the Gallic tribes. While Jacques Du Bois was still a boy, the Thirty Years' War had been ended by the Peace of Westphalia in 1648, and by it religious toleration had been guaranteed to Calvinists and Lutherans in all parts of Europe embraced in the treaty, except in the Austrian dominions. Between this date and the revocation of the Edict of Nantes in 1685, the Huguenots of France enjoyed a certain degree of religious liberty, and the emigration to Holland and England was, in great measure, suspended. But in the Walloon country, which was exempted from the benefits of the treaty as being under Austrian rule, the same persecutions continued which for more than a century had driven thousands of Walloon families to England and Holland, as well as to America, where in 1623 they had made the first permanent occupation of this island of Manhattan, and later in the century took a prominent part in the Hudson River settlements.

The date of the birth of Jacques Du Bois is unknown. The baptismal record of his family at Wicres shows that the names of the sons of Chretian Du Bois, his father, have been obliterated—probably by design, as such mutilations of records were of common occurrence at that time in the case of Protestant families. In early life Jacques went to Leyden, Holland, and there was married in 1663, in the Walloon church, to Pierrone Bentyn, "a young maiden from near Lille," his own neighborhood; so reads the record in the town hall of that "good and pleasant city," which our Pilgrim Fathers remembered with such warm affection. His brother Louis, afterward familiarly known in this country as "Louis the Walloon,"

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was born in 1626, emigrated to the Palatinate, and was married at Mannheim in 1655. With a company of French Protestants he embarked for America in 1660, and settled on the Hudson River at Hurley, three miles from Wiltwyck, now the town of Kingston. Three years later a new war broke out with the Esopus Indians. On June 7th, 1663, the two villages, Hurley and Wiltwyck, were attacked and almost destroyed. Twenty-four of the settlers were killed, and forty-four captives carried off—one man, twelve married women, and thirty-one children; among them the wife and three children of Louis. Nearly three months elapsed before the captives were rescued, and then just in time—so runs the tradition—to save some of them from a cruel death. The wife of Louis had been placed on a pile of wood to be burned to death, and was singing in Marot's French version the 137th Psalm: "By the rivers of Babylon there we sat down, yea, we wept when we remembered Zion. . . . For there they that carried us away captive required of us a song." Just at this moment the Indian fort, in which the captives were imprisoned, was stormed by a rescuing party under Captain Krygier, with whom came Louis, his heart on fire to avenge his wrongs. The traditions of the family relate that just as the party neared the fort Louis was fired upon by an Indian from behind a tree. Louis attacked him with his sword, and "ran him through with such force that the sword entered a log and had to be withdrawn by placing his foot upon the prostrate body and then jerking it away by main strength." The chief of the tribe and a considerable number of his followers were slain, and twenty-three of the captives recovered.

Three years afterward, in 1666, Louis Du Bois, with eleven associates, purchased from the Indians a tract of more than thirty-six thousand acres, which "included part of the present townships of New Paltz, Rosendale, and Esopus, and the whole of Lloyd," and in the following year a patent deed confirming the purchase was issued by the colonial government to "Louis Du Bois and his

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partners." Louis had not forgotten the days of his exile in Mannheim, and gave to this new home in the Wallkill Valley the name "Le Nouveau Palatinat," or New Paltz. The Paltz rock, now one of the greatest attractions of Lake Mohonk, was one of the landmarks of this purchase.

Jacques Du Bois left Leyden in 1675, came to this country with his family, and settled at Kingston, Ulster County, N. Y. He died in the following year. His son Pierre, or Peter, removed to Dutchess County. The descendants of Louis and Peter are known as the Ulster County and the Dutchess County branches of the family. They soon intermarried with the Dutch settlers, and in the following century the family tree received an English graft through Dr. Du Bois' maternal great-grandfather and grandfather, both of whom were physicians. He used to say of himself that he owed his impetuousness to the French, his obstinacy to the Dutch; may it not be also that his love for his profession came with his English blood?

Dr. Abram Du Bois was born in 1810 in Red Hook, Dutchess County, N. Y. He fitted for college at a private school in Granby, Conn., and in 1827 entered Washington (now Trinity) College at Hartford, graduating there in 1830. He began the study of medicine in Rhinebeck in the office of Dr. Nelson, and came to New York in 1832, where he entered the College of Physicians and Surgeons as a pupil of Dr. John Kearney Rogers, at that time one of the surgeons of the New York Hospital, and was graduated in 1835. This association with Dr. Rogers led to a very warm friendship and to important results in the life of his pupil. After his graduation, by Dr. Rogers' advice he spent nearly two years in Europe, most of the time in Paris, pursuing his further medical education, and on his return was appointed resident assistant physician of the Almshouse, now Bellevue Hospital, under Dr. Benjamin Ogden. Here, during a severe epidemic of typhoid fever, he was attacked by the disease himself, and nearly lost his life. On his recovery he was

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presented by the Commissioners of the Almshouse with a case of surgical instruments and a very appreciative letter of thanks for his faithful services during the epidemic. On November 8th, 1838, he was married to Catherine M. Brinckerhoff, of Fishkill, N. Y., by whom he had two sons and a daughter, all of whom are now living. In 1843, again through the influence of Dr. Rogers, who was one of the founders of the New York Eye and Ear Infirmary, he received an appointment on the medical staff of this institution, and for forty-eight years served it faithfully in the several capacities of assistant surgeon, surgeon, secretary, consulting surgeon, trustee, and vice-president, besides contributing to its support by liberal donations to its funds. Dr. Rogers' kindness to him at the outset of his professional career made a deep impression upon him. He never forgot his indebtedness, and repaid it in ways that were characteristic of him. If old friendships are renewed in the next world, I am sure there has been no new-comer there whom Dr. Rogers has greeted with more cordiality than his grateful pupil.

With the interests of the medical profession in this city Dr. Du Bois was intimately associated. So far as its honors were concerned, he let them seek him rather than strive for them himself. He shrank from the mere appearance of a desire for notoriety, but this was rather from natural modesty than from unwillingness to take his share in public duties. At the time of his death he was consulting surgeon of the New York Institution for the Blind, and to the New York Eye and Ear Infirmary; consulting physician of the Northern Dispensary and to the Home for Incurables; fellow and founder of the New York State Medical Association, and the New York County Medical Society; benefactor of the Society for the Relief of Widows and Orphans of Medical Men; honorary member of the New York Physicians' Mutual Aid Association; and honorary Fellow and benefactor of the New York Academy of Medicine. He was also one of the founders of the New York Medical and Surgi-

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cal Society, and was a constant attendant at its meetings, where he strengthened some of the closest friendships of his life.

Dr. Du Bois was a man of strong traits of character. Behind his quiet and retiring manner lay a Dutch energy and determination that gave him no rest until his object was attained. He had positive convictions, and the courage to follow them at all hazards. His was no placid spirit that could remain an indifferent spectator of injustice. When a wrong was to be righted, and he could aid in righting it, he stepped into the front rank of the fight without hesitation. Nothing aroused his indignation more strongly than dishonorable conduct in professional relations. This was his idea of the unpardonable sin. He had a high ideal of a physician's duties to his patients and to the public, but he held others to no standard that he did not keep for himself, and in every such relation he was sound of life and free from stain—"*integer vitæ scelerisque purus.*" On questions of medical ethics he was instinctively a conservative, and held it a sacred duty to "contend earnestly for the faith once delivered to the saints." At the same time he was an honorable antagonist, never dealing a blow from behind, but delivering it boldly in front. Such a man, especially if he be by nature impetuous, is liable to judge others rashly, to make insufficient allowance for the weakness of human nature. Mistakes of this kind are inseparable from such a temperament, and Dr. Du Bois made his share of them, but they were always of the head rather than the heart. When he saw his error, when his antagonist's visor fell and disclosed the face of a friend of right doing, he sheathed his sword and offered the friendly hand.

This was the other side to his character, the one that was the chief attraction to those who knew him well—his generous, kindly, sympathetic nature. While his public benefactions were large, his private ones were even larger —greater, I suspect, than was known to his friends or even to his near relatives. One of the last acts of his life was

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to leave a sealed envelope to be opened after his death. It was found to contain a request that certain persons, to whom he had long been a friend in need, should be still provided for by his heirs.

It was in the sick-room, however, and in his relations to his patients, that he was seen at his best. As the strongest men are often the gentlest, so he joined to the masculine force that gave him firm control of his patient the tact and delicacy of a woman. Every detail that could add to the comfort of the patient or promote his recovery was attended to with scrupulous care, nor was any sacrifice of personal ease too great if the case required it. In the same spirit, the pecuniary consideration was always a subordinate one. He kept close to Emerson's rule in such matters: "Let not the tie be mercenary, though the service be measured by money," and some of his patients will retain a grateful remembrance of his consideration for them in pecuniary trouble.

He carried the same kindly spirit into his relations with his professional brethren in sickness or sorrow. At such times, especially, he was a true friend, and in the latter years of his life gave much time to the conscientious discharge of these duties, as if he foresaw the time when he would appreciate such attentions to himself.

Cicero, in his "De Senectute," has drawn a charming picture of the pleasures of old age; of the honors that are paid to it; of its freedom from the thraldom of the passions and from many of the temptations of early life; of its satisfaction with higher rather than with lower pleasures; of its delight in long-tried friendships; and of its prospect of a safe harbor near at hand. But how rarely do we see this picture realized! Far more commonly, if we live to old age, Nature proves a harsh nurse and weans us from the world with a rough hand. She lessens our appetite for its attractions by impairing our capacity for enjoying them; she withdraws us from one position of responsibility after another, in which we had thought ourselves indispensable, and yet we find the earth turning

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on its axis as quietly as heretofore. She takes from us, by death, one by one of our friends, and then perhaps by a long illness shuts us up in seclusion, where even of the friends that are left some do not take the trouble to seek us. This last and sorest trial—the neglect of friends—happily was spared to Dr. Du Bois. During the two years in which he was withdrawn from active life by his increasing infirmities, his friends gathered about him, and, in part at least, repaid him for the kindness he had shown to others on similar occasions.

It is proper that I should refer briefly to his gifts to the Academy, as they contributed largely toward inaugurating the present era of prosperity, and were made, moreover, when he was not a member. The purchase of a new building in 31st street had exhausted the funds of the Academy. A suitable hall for large meetings, and means for increasing the library, which had just received an impetus by the generous donation of Dr. Purple, were urgently required. Both of these necessities were met by Dr. Du Bois, and in a characteristic way. His intention was to bear the whole expense of the new hall himself; but in order to stimulate the generosity of others, his first offer was a contribution of five thousand dollars if three thousand dollars were raised by others. When the latter sum was secured, he then gave three thousand dollars more, with the condition that the sum subscribed by others should be applied to the permanent Library Fund. His interest now aroused in the library, he told the librarian to order such new books as were needed, and send all the bills to him. This arrangement—a private one between the librarian and himself—was carried out during the two following years at an expense of about two thousand dollars. For his generous interest in the Academy he was elected an Honorary Fellow and Benefactor in 1879, and a commemorative tablet was placed in the hall on its completion. It now rests in one of the halls of this building, where I trust it will remain as a permanent memorial, honorable alike to him and to the

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Academy. This new honor was much appreciated by him in his last illness.

The life of Dr. Du Bois teaches its own lessons, and I have but a single suggestion to make in connection with it. The past twenty-five years have witnessed many important changes in our profession in this city, which have not been wholly for the better. Along scientific lines there has been doubtless a great advance; a marked improvement also as regards the diminished frequency of professional jealousies and quarrels. With the development of New York into a great metropolis, our profession has outgrown its provincialism; there is now more room and less friction, and controversies turn more commonly on questions of public importance. These are great and undeniable gains, but there have been losses as well. The introduction of specialism has changed, for the worse, the relations between physician and patient. Formerly the family physician had undivided responsibility; now he shares it with half a dozen others, and so there has been a loss of full confidence on one side, and of the sentiment of personal attachment on the other. This community of interest in the same patient has altered also the relations between ourselves, and has introduced perplexing questions of medical etiquette. Too often, also, it has led to the adoption of the spirit and the methods of trade, which, however proper and even honorable in business affairs, are eminently undesirable in our profession and destructive of its best interests. But I have no desire to praise the past at the expense of the present, to take the ungrateful part of a "laudator temporis acti." I am sure that the heart of our profession is as sound at core as it ever was, and that the present unsettled state of professional relations will disappear when we have readjusted ourselves to the new conditions. But if our high ethical standard is to be maintained, and with it the solidarity which has made us the envy of other professions, this readjustment can be effected only by preserving the high sense of personal honor, the ardent love of our

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profession, and the courtesy in professional relations that characterized the life of our Honorary Fellow and Benefactor, Abram Du Bois.

MEMOIR OF FORDYCE BARKER, M.D., LL.D.

By WILLIAM T. LUSK, M.D.,
NEW YORK.

DR. FORDYCE BARKER was born in Wilton, Me., on May 2d, 1818. His father, Dr. John Barker, was a busy country physician. He had been for two years an army surgeon in the war of 1812. As I remember him, he was a man of distinguished presence and of courtly manners. The relations of father and son to each other were in those days ideal. The elder seemed to delight in the exuberant spirits of the younger, while the latter, in spite of his natural gayety, never forgot the reverence of deep filial respect. The motto on the family crest, *Semper constans et fidelis*, seems to indicate that the Barkers were regarded by their neighbors as true and loyal friends.

Dr. Barker's mother, Phœbe Abbott, was an engaging, refined, and intellectual woman. The Abbotts recall the words of Dr. Holmes: "We have in New England a certain number of families who constitute what may be called the Academic Races. Their names have been on college catalogues for generations. They have filled the learned professions, more especially the ministry, from the old colonial days to our own times."

Wilton is situated in a picturesque country not far from the Rangeley Lakes. It is an agricultural community with about twenty-five hundred inhabitants. In recalling the surroundings of Dr. Barker's childhood, it is necessary to bear in mind that in the early part of the century agriculture was still the leading industry of New England. Theological speculations, the Sunday sermons, the town meetings, and divisions of opinion concerning the political

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theories of Hamilton and Jefferson, kept the faculties awake and offset the stagnation of rural life. Farmers then read books, and on grand occasions some of them wore ruffled shirts and did not despise the amenities of social life. Their political ideal was George Washington, and not sockless Simpson.

The Barker homestead was a one and a half story house. It stood on a hilltop and commanded an extensive view. In the rural scenery surrounding that isolated domicile there must have been much to feed the imagination of the young boy.

There were no regular schools in Wilton, so Fordyce's early training was conducted by his parents; and no boy ever had better teachers. He had read the New Testament aloud to his mother by the time he was six years of age. His father was a great lover of books, and knew how to impart to the son his own fondness for reading. The rule of the house was stern, but tempered by affection. The beautiful mother writes in her diary, May 2d, 1819: "My little Fordyce is one year old this day. O Lord, I do not ask length of days, riches, nor honor for him, but be pleased to grant me this petition. . . . If his life shall be spared, may he seek the Lord in his youth, and flee from the vanities of this deceitful world. Bestow upon him, O Lord, a meek and docile disposition, one that delighteth in the ways of godliness."

At eleven years of age he was sent to China, Me., where he began his classical training under the tuition of his uncle, John S. Abbott, afterward a prominent lawyer at Norridgewock and Boston. At the end of a few months he was, however, withdrawn and placed at a school which had been opened by Prof. Green at Farmington, seven miles from Wilton. While there he was an inmate of the family of an aunt (his mother's eldest sister), for whom he ever retained a warm affection. In September, 1832, he was sent to Limerick, Me., sixty to seventy miles from his home. It was thought at the time that he would still need two years to complete his preparation for college,

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but, thanks to his diligence and aptitude, he was able to enter Bowdoin the following year. In Limerick he made his home with the Rev. Charles Freeman, the pastor of the Congregational Church, who had married another of his mother's sisters. Mr. Freeman was a rare scholar, and his wife was a highly educated and accomplished woman. It is interesting to note that in early life the boy's natural gifts received their full development by wholesome training, and by intercourse with cultivated, scholarly people.

In 1833, at the age of fifteen, young Barker began his college career. Bowdoin, his Alma Mater, was a small college, but, as Daniel Webster said of Dartmouth, "there are those who love it," and the faculty of Bowdoin College in those days was one in which a man might in afterlife take a just pride. The president, William Henry Allen, was a typical scholar, and was possessed of enormous industry. He collected ten thousand words not contained in standard dictionaries; his "American Biographical and Historical Dictionary" contained seven thousand names; in "Junius Unmasked" he sought to prove that Lord Sackville was the author of the famous letters; and besides these better known of his works, he wrote sacred songs, biographies, poems, and memorial addresses without number. Longfellow and Daniel R. Goodwin held in succession the chair of modern languages; Alpheus S. Packard was professor of the ancient languages; Thomas C. Upham taught metaphysics; and Parker Cleaveland—of whom Longfellow wrote the well-known lines, "For him the teacher's chair became a throne"—was the professor of chemistry.

The class of 1837 numbered forty-four, among whom were Governor Gardiner and John A. Andrews, afterward Governor of Massachusetts. All contemporary evidence goes to show that Barker when a student was a handsome, jovial, winning young fellow, with a beautiful tenor voice. "Sing on, old friend, and enjoy life," one of his fellow-students writes in his class album. Another speaks of his "smiling face," "his hopeful character."

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And still another wishes that he "may conciliate as many friends in the world as he has in college."

I have heard Dr. Barker disclaim any pretence to scholarship while at Bowdoin. Nevertheless we know that he was at college, as in after-life, a great reader, with a wonderfully retentive memory and with a natural gift of eloquence. He was only fifteen years of age when he, in response to their invitation, delivered the Fourth-of-July oration before the townspeople of Wilton. When twenty-one he was a popular speaker in the Harrison campaign.

After graduation young Barker began the study of medicine. His father had indeed urged him to select another profession, but the scientific bent of the boy's mind was decided. He had shown in college more taste for collecting shells than for Greek construction, and the desire to follow in his father's footsteps came to him as a matter of course.

The faculty of the Bowdoin Medical School, from which four years later Barker received his degree, was made up of Henry H. Childs, James McKeen, Jedediah Cobb, Joseph Roby, John Delamater, and Ebenezer Wells. Of these Delamater was one of the most successful medical lecturers this country has ever produced.

There were in those days no clinical advantages connected with the country schools, but then the preceptorship system was a reality, and a large, varied country practice, such as the elder Barker possessed, afforded abundant material for instruction to an eager, inquiring lad; and in this instance the preceptor was a man exceptionally gifted and wise.

In the youth's professional training, provincial narrowness was avoided by a year spent in Boston, where he busied himself with hospital work, and where, as the private pupil of Prof. Bowditch, he gained access to the higher professional circles, which were to him an additional inspiration.

In 1841, at the age of twenty-three, Fordyce Barker

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received the degree of Doctor of Medicine. Owing to signs of incipient phthisis, he was advised by Dr. Bowditch to establish himself in practice in a locality where the climate was more genial than that of his native State. He accordingly started in the summer time, on horseback, and rode in a southerly direction. Travel in New England was then still to a great extent by stage or by personal conveyance. The post tavern was comfortable, and the main roads were fairly good. To a young fellow with a sweet voice, a handsome face, and plenty of letters of introduction to families living *en route*, the journey must have been a pleasant one.

With his arrival in Norwich, Conn., his journey ended. As he rode through Washington street in the bright morning light, the picturesque Cove, the beautiful old elms, and the fine colonial houses with their extensive lawns, impressed his imagination like a fairy dream. The old town was reported to be singularly free from the scourge of New England, *i.e.*, consumption, and so here our young physician decided to establish his home. No new-comer was ever more welcome. The social stiffness of the gentry softened at his good humor and kindly laugh, and the young men of talent quickly became his devoted adherents and his life-long friends.

In those days society in Norwich presented many features of interest. There were plenty of Huntingtons, and Trumbulls, and Williamses, and Tracys of the first generation from the big-wigs of the Revolution. The Fourth-of-July platform still furnished one or two surviving soldiers of the war for independence. Poor Hannah Arnold was ninety years old and looked like a witch. She lived in a small, mean, red house, and was shunned by every one—the vicarious victim of the popular hatred for her cousin Benedict. There were one or two relicts who on grand occasions wore gowns, with short waists and long trains, that had been carefully preserved for half a century. Asa Fitch had lived many years in France. On his return he reproduced at Fitchville a Yankee version

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of Versailles, and delighted us boys with a display of the fine manners of the old *régime*. Richard Adams, a West Indian, who read the *Albion* to his dying day and never surrendered his allegiance to King George, upheld the standard of British politeness. At the head of the bar were Henry Strong and Lafayette S. Foster, both of whom became, later, senators of the United States. The leading clergymen were William F. Morgan, afterward the well-known rector of our St. Thomas'; and Parson Gulliver, irreverently termed by the Irish "the red-headed priest," to whose battle against the supineness and indifference of its citizens Norwich now owes what is perhaps the finest free-school system in New England. Dr. Farnsworth was the leading physician—a big-headed, big-hearted, quarrelsome man, intense in his hatred, but with a woman's tenderness of heart. He loved Barker. At the time we are commemorating, William A. Buckingham, afterward Connecticut's great war governor, was training for his future solemn responsibilities by leading in prayer meetings.

More immediately in Dr. Barker's own set were William and Frank Bond; Edmund Perkins, whose fiery eloquence used to make our pulses throb; Henry Huntington, for many years the Paris correspondent of the *Tribune;* and Louis and Donald Mitchell. The latter was wont to declare that the "dear Fritz" of the Lorgnette's letters was his friend Dr. Barker. My list would not be complete without the name of Captain, afterward General, Daniel Tyler. Tyler was of great service to Barker. He had the buoyant spirit which lifted up the hearts of his friends in adversity, which never doubted their success, and which indignantly stamped under foot the work of cowards and sneaks who seek to effect the ruin of others by insinuation and subterfuge.

I speak of these friends of Barker's youth because they were loyal to him through life, they rejoiced in his prosperity, and were proud of the honors that were showered upon him. And who can say how far a man's success in

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life is due to his ability to command the fidelity of his friends?

For those who remember Dr. Barker's singular timidity, in latter years, as regards the use of the knife, it may seem strange to learn that his early aspirations were to become a surgeon.

On September 14th, 1843, he married at Harrisburg, Pa., Miss Elizabeth Lee Dwight, whom he had previously met in Norwich. Her grandfather, Captain Benjamin Lee, was related to the two Pitts, and had been a fellow-midshipman in the British navy with Lord Nelson and Prince William, afterward the sailor-king of Great Britain.

On October 1st, 1844, Dr. Barker set sail with his young wife from New York for Havre in the ship *St. Nicholas*, of nine hundred tons burden. Foreign travel was confined then to a comparatively select class, and the long voyages were prolific in lasting friendships. On this occasion our Fortunatus met for the first time Mr. John Astor, Mr. Newbold, the Messrs. Edgar, the Henry Masons, and Mr. Ogden Hoffmann, Jr. In after-life the friendship of youth with these men ripened into a tie of brotherhood.

In Paris, during the winter of 1844–45, he was indefatigable in his attendance upon lectures and clinics. Paris then stood at the head of the medical world. Among the names that lent lustre to its famous school were those of Cruveilhier, Nélaton, Velpeau, Dupuytren, Laënnec, Louis, Trousseau, Dubois, Huguier, Lisfranc, Chomel, and Jobert de Lamballe. Imagine the transports of an ambitious young man when admitted into such a fellowship!

Dr. and Mrs. Barker made for themselves a pleasant home in the Hôtel de Hollande. In both the social instinct was strong, and the American circle in Paris was most agreeable, so the winter passed rapidly. June and July were spent in travel, and in August they set sail for New York by the Cunard steamship *Caledonia*. Among their fellow-passengers was Sir Henry Holland.

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On their return home a way to the leading practice was opened to the young physician by the temporary retirement of Dr. Farnsworth, who had previously—as indeed he did afterward—exercised supreme authority in medical matters in Norwich and its vicinity. The next few years were pleasant ones. In Norwich his only son was born; he was trusted by all in his professional capacity; he brought happiness into the sick-room by his gentleness and cheerful spirits; he could tell a good story; he could sing beautifully; he could play the organ, the piano, and the trombone; he had composed music to songs; and it is needless to say he was welcome everywhere.

In Paris he had taken an eager interest in obstetrics and the new department of gynæcology. In 1846 he was appointed Professor of Obstetrics at Bowdoin, but filled that office for only one year. He was too busy to spare the time.

In May, 1848, he delivered the annual address before the Connecticut Medical Society. It bore the title: "On Some Forms of Disease of the Cervix Uteri." It possessed the qualities of his later writings. The arrangement was clear, the style was elegant, and the writer had something new to tell. Before the reading of the address the writer had local fame; afterward he had won distinction.

When, two years later, the organization of the New York Medical College was being effected, the chair of obstetrics was offered to Dr. Barker. Its acceptance involved his removal from Norwich, and was strongly opposed by many of his warmest friends. He had already, they argued, a comfortable income and an insured future, advantages which it would be foolish to put aside for the hazards of a new fortune. But Dr. Barker was thirty-one and of a sanguine temperament.

In March, 1850, he moved to New York. His first home was at No. 16 East Eleventh street, near Grace Church. The New York Medical College was not a suc-

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cess. It had in it, indeed, elements of promise. For instance, the faculty was on the whole a strong one: Carnochan, Peaslee, Childs, Barker, and Doremus were able lecturers, Davis brought with him a fine reputation from the West, and Green had his votaries. But the school did not fill a want, and it received from the profession of the city a stepchild's welcome. Aside from the incidental disciplinary advantages, it did very little to further the interests of its promoters. Dr. Barker's own connection with it ended in 1857.

In recalling the medical instruction of those days, it must be remembered that the clinic, in a proper sense of the term, did not exist. The popular teacher endeavored to make good the defect by the recital of illustrative cases from his own practice. These were sometimes thrilling, sometimes pathetic, sometimes humorous. They afforded fine scope to persons of natural oratorical gifts,and it is needless to say that among the old college favorites Dr. Barker was *facile princeps.* As a medical correspondent once stated it, when he came to New York, in the early sixties, it was all Dr. Barker and obstetrics, whereas a dozen years later it was gynæcology and Dr. Thomas. But those halcyon days have now departed. At present, with object teaching at the bedside and in the laboratory, the didactic lecturer is rapidly being relegated to the rank of a privileged bore.

From the time of Dr. Barker's first entrance upon life in New York, he often responded to calls made upon him to participate in discussions upon current questions. Thus we find among his early papers a pamphlet termed "A Plea for Hospitals." It is full of interesting information and of old-time eloquence. I will not quote from it here. Fashions change, and eloquence is ephemeral.

It was my privilege in 1853, while in attendance upon the old Anthon Grammar School in Murray street, to spend a few months in Dr. Barker's family. His practice was at that time small. It is needless to state to a body of physicians, that neither popularity as a teacher, nor

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distinction as an essayist influences the number of visitants in a practitioner's ante-room. Yet no one who knew Dr. Barker then doubted for a moment his ultimate success. He was handsome, ambitious, and hard-working. Though he could not be extravagant, there was always a seat at his table for a friend. His loyal wife made every one welcome. The dinners were unostentatious, but the talk was always good, and to a young lad an education. From the outset he gained admittance to the literary circles of the city. Within a year he was made a member of the Century Club. Donald Mitchell was his dearest friend. He became intimate with Washington Irving; Thackeray, who lectured here in 1855, delighted in his companionship. He was the "beloved Æsculapius" of Dr. Hawks. Old Dr. Francis extended to him the right hand of fellowship. The acquaintances he had made in Europe welcomed him to their homes. When his bachelor friends married their wives became his ardent supporters.

In 1857 he removed from a patient, by enucleation, a uterine submucous fibroid. The woman had previously consulted the most eminent surgeons of London and Paris. They had given her no encouragement. She was a member of a large and influential family. When she recovered, Dr. Barker was adopted by the entire clan. To his dying day these early friends sustained his fortunes, fought his battles, and were jealous of his rivals. From this time forth his career was a succession of triumphs. He was an excellent practitioner, kindly and sympathetic. He was an ingenious therapeutist, with more faith in hygiene than in tartar emetic or in calomel. He loved his profession, and kept abreast with every advance in science. The confidence and affection he inspired in his patients were almost touching. When in 1866 he held out his hand to help me as a young man, his clientèle included nearly every one that was fashionable or famous.

But in the midst of his prosperity his many little deeds of kindness must not be forgotten. To his readiness to help young men in their early struggles many of my hear-

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ers doubtless can personally testify. A few days ago I received the following letter:

"NORWICH, CONN., October 24th, 1891.

"MY DEAR MRS. BARKER: It is needless to reiterate the profound sympathy which my wife and I feel for you in the loss of your distinguished husband. Gratitude prompts me, however, to relate an incident, which occurred to me during the civil war, which illustrates Dr. Barker's generosity and patriotism.

"After the capture of Fort Pulaski, at the mouth of the Savannah River, by our troops, I returned to the North, an apparent wreck from the results of typhoid fever. My physicians said that my days of usefulness were numbered and that I never should be able to rejoin the army again. My heart was filled with deep chagrin, but resolution succeeded despondency, and with great effort I dragged my emaciated body to New York to consult Dr. Fordyce Barker. He came to see me at the Fifth Avenue Hotel, with Mr. Wm. Bond. The doctor carefully diagnosed my case, and then said—with a pleasant smile which I cannot forget—'You must have a wonderful constitution to have survived so much quinine and blue mass as you have taken; the treatment must be changed at once.'

"A few days later the change for the better was marvellous—I was able to call on him. A week later he gave me a lunch at Delmonico's. Three weeks later I returned to my command at Beaufort, S. C., in perfect health. Imagine, if you can, my pleased and grateful surprise when, on asking Dr. Barker for his bill, he said to me, 'I feel well paid in seeing you strong again. I shall take nothing from you, nor will there be any charge from me for treatment of Norwich soldiers who may desire my services during the war.' What could have been more gratifying to a young soldier who had expected to pay several hundred dollars for the restoration of his health and prospects in life?

"I am, with high esteem, yours sincerely,

"WM. G. ELY (by A)."

From my intimacy with Dr. Barker I can affirm that in the days of his prosperity, while his time was precious and every moment was of value, he never showed impatience when called upon to render professional aid to old friends overtaken by adversity.

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In 1857 Dr. Barker took part in a discussion on Puerperal Fever before the Academy of Medicine. The subject at the time excited great interest. The contemporary record states that the hall was crowded. Dr. Barker's address possessed the singular clearness that marked all his public efforts. With great dialectic skill he maintained in the face of the prophets the doctrine of the essentiality of the disease. The views he then expressed interest us, as they furnished the basis and incentive in after-years for his great work on the Puerperal Diseases. This, the product of his ripened experience, is probably the best piece of medical literary workmanship this country has produced. To be sure, the doctrine inculcated is now dead, killed by the investigations of Koch and Pasteur; but it must be recognized that it did good work in its time by checking the prevailing tendency to exclusivism, which insisted that puerperal fever was a metritis, or a phlebitis, or a lymphangitis, or some other single form of uterine inflammation.

In 1860 Dr. Barker was President of the New York State Medical Society. In 1861 he was one of the organizers of the Bellevue Hospital Medical College, and lectured in that institution until 1867, when, because of his vocal difficulty, he decided that it would be prudent to give up the regular filling of his professorial duties. He continued, however, to give clinical lectures at intervals in the Bellevue Hospital.

From 1860 to the end of his professional life Dr. Barker was engaged in reaping the fruits of his high reputation. His general and consulting practice rapidly increased. When it was known that he was to take part in society discussions he was sure to be met by a throng of sympathetic listeners. The laws of legal evidence had for him a peculiar fascination, and his opinion as a medical expert came to be highly valued. His acquaintance included most of the prominent men of the day. Mr. Seward, Mr. Fish, Mr. Blaine, President Grant, President Arthur, Mr. Bancroft, Richard Henry Dana, David Wells,

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Oliver Wendell Holmes, and Charles Dickens, are only a few of those I recall from his intimate associates. In 1858 he began the summer trips to Europe which, with the exception of a single year, were repeated to the time of his death. They did much to prolong his useful life, and made him a host of friends in European countries. Personally, I owe many valued acquaintances in foreign lands to letters of introduction which he gave to me. I know therefore from experience of the love and admiration he excited abroad as well as at home.

In 1873 Dr. Barker associated with him Dr. A. A. Smith. The union proved a fortunate one. Through the fidelity and devotion of the younger man he soon found himself relieved from a large amount of detail work, and with time to devote to the general service of the profession, and to the boards of many of the great charities of the city.

In 1876–7 he was president of the Gynæcological Society. In 1879 he was called to the presidency of this Academy, an office he filled for six years. They were years of unexampled prosperity. Under his benign rule membership in the Academy came to be regarded as a coveted honor; the meetings were crowded; the papers read were of a high order. He was probably the best presiding officer the medical profession in New York has ever possessed. His kindly disposition calmed troubles in the council chamber and softened the asperities of debate. In the negotiations for the library of the Medical Journal Association, I again speak from experience when I state that it was his patience and unruffled temper which secured for the Academy that priceless treasure.

He received the degree of LL.D. in 1878 from Columbia College; in 1884 from Edinburgh on its three hundredth anniversary celebration; in 1887 from Bowdoin on the occasion of the fiftieth anniversary of his class; in 1888 from the University of Glasgow; and a similar compliment was offered him by the University of Bologna on

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its seven hundred and fiftieth anniversary, but he was prevented by illness from being present for its reception.

In 1885 I called on Dr. Barker in London. He was living in an apartment in a retired part of the city, 19 Fitzroy Square, as he wished to be out of the way of callers and invitations, that he might have leisure to complete a new work upon which he had been some time engaged. I was much impressed with the unwholesome appearance of the house and the forlornness of its surroundings. An illness followed a short residence, which left him with impaired health. For three or four years he continued in active practice, and his home was the scene of its wonted hospitality. Then came the time when he was obliged to measure his strength. He never, however, abandoned his profession altogether. He still called professionally on his old friends, took part in consultations, and received patients at his office; but it was the work of a brave soul battling with adversity. To the close of his life his intellect remained clear. On Wednesday, May 28th, he dictated a letter to a physician seeking counsel. He died on May 30th, 1891, a few minutes before three. He was conscious until nearly noon. Two years previously he had been confirmed by Bishop Potter in the Episcopal Church. All his life through he had studied with the keenest interest the problems of a future state. Bishops Lee, Clark, Bedell, and Brooks, and Drs. Morgan and Hawks, had been his devoted friends. There was no sharp break in his life when he took his first communion, but toward the end, when in anguish and pain, his religious faith gave him the fortitude to bear his burden with dignity, without complaint, and with beautiful resignation.

My poor words can add nothing to his fame. They have been written with reverence and tenderest affection.

Some of the Societies and Organizations to which Dr. Fordyce Barker belonged.—The Century Club, one of its oldest members, in 1851; Fellow of the Academy of Design, New York City, 1864; American Geographical and Sta-

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tistical Society, May 15th, 1850; American Bible Society, life member, June 12th, 1867; St. John's Guild, member, June 20th, 1871; University Club; Church Temperance Society; Charity Organization Society; Life member Metropolitan Museum of Natural History; Physicians' Mutual Aid Association; Fellow of the London Medical Society, November 4th, 1878; Member of London and Edinburgh Obstetrical Societies; Corresponding Member Philadelphia Obstetrical Society, January 5th, 1874; also Fellow or member of the Royal Society of Greece, and elected president of the Anglo-American Society of Paris for the meeting of October 6th, 1890, at which he was unable to be present.

LIST OF THE PUBLISHED WRITINGS OF DR. FORDYCE BARKER.

1848. On Some Forms of Disease of the Cervix Uteri. (Address as President of the Connecticut Medical Society, May, 1848, and printed in the Proceedings.) 8vo.

1851. A Plea for Hospitals. (On the necessity for a new hospital in the City of New York.) New York.

1853. Lectures on Uterine Displacements. Reported by B. T. Roath. Lecture First. (Reprinted from New York Medical Gazette.) New York: Baker, Godwin & Co. 23 pp., 8vo.

1854. On the Induction of Premature Labor. (American Medical Monthly, New York, 1854, vol. i., pp. 270–275.)

1857. A Case of Fibrous Tumor of the Uterus, accompanied with Excessive Hæmorrhage, Successfully Treated by Excision. New York. 8 pp., 8vo.

1857. Remarks on Puerperal Fever before the New York Academy of Medicine, October 7th, 1857. (Reprinted from American Medical Monthly, New York, November, 1857.) New York: E. P. Allen. 23 pp., 8vo.

1858. On the Comparative Use of Ergot and the Forceps in Labor. Address as the President of the New York State Medical Society, February 12th, 1858. (Reprinted from the American Medical Monthly, New York, 1858.) New York: H. B. Price. 16 pp., 8vo.

1858. Remarks on Puerperal Fever before the New York Academy of Medicine, October 6th, 1858. By Fordyce Barker and A. K. Gardner. New York. 16 pp., 8vo.

1861. On the Use of Anæsthetics in Midwifery. Read before the New York Academy of Medicine, November 20th, 1861. (Transactions of the New York Academy of Medicine, vol. ii., part 8, pp. 251–268.) New York: S. S. & W. Wood. 8vo.

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1861. An Effort to Shorten the Duration and Diminish the Pain of the First Stage of Labor; with a Record of One Hundred and Forty-seven Cases. (American Medical Monthly and New York Review, 1861, vol. xv., pp. 1–9.)

1864. The Rise in Harlem—a Comedy.

1870. On the Treatment of Croup. A Letter to Prof. A. Jacobi. New York: W. A. Townsend & Adams. 16 pp., 8vo.

1870. On Seasickness: A Popular Treatise for Travellers and the General Reader. New York: D. Appleton & Co. 36 pp., 12mo.

1871. Blood-letting as a Therapeutic Resource in Obstetric Medicine. (Reprint from New York Medical Journal, 1871.) New York: D. Appleton & Co. 14 pp., 8vo.

1874. The Puerperal Diseases: Clinical Lectures Delivered at Bellevue Hospital. A Course of Lectures Valuable alike to the Student and the Practitioner. (This work is now in its fourth edition. It was republished in London. A German translation was issued at Leipzig, an Italian at Milan, a French at Paris, a Spanish at Madrid, and a Russian at St. Petersburg.) New York: D. Appleton & Co. xiii., 526 pp., 8vo.

1875. The Relation of Puerperal Fever to the Infective Diseases and Pyæmia. An address delivered at the Obstetrical Society of London, July 7th, 1875. Louisville. 15 pp., 8vo.

1876. Vaginal Hernia or Vaginal Enterocele. Remarks before the New York Obstetrical Society on a case communicated by B. A. Clements, M.D., Surgeon U. S. A., June, 1876.

1876. Annual Address before the American Gynæcological Society as its First President.

1877. Relation of the Urinary Organs to Puerperal Diseases. Remarks on Paper of W. M. Chamberlain, A.M., M.D.

1877. Discussion on the Influence of Medicines, particularly Narcotics, on the Infant, when Administered to the Mother during Pregnancy and Labor. By Drs. Mundé, Barker, Peaslee, Gillette, Thomas, and others. (Reprinted from American Journal of Obstetrics, New York, 1877, vol. x.) New York: W. Wood & Co. 37 pp., 8vo.

1878. Remarks on Obstetric Forceps. Tarnier's new instrument. (American Journal of Obstetrics and Diseases of Women and Children, January, 1878.)

1878. Induction of Premature Labor in the Albuminuria of Pregnancy. (American Journal of Obstetrics and Diseases of Women and Children, July, 1878.)

1879. Inaugural Address delivered before the New York Academy of Medicine, January 16th, 1879. New York: Printed for the Academy. 14 pp., 8vo.

1880. Puerperal Malarial Fever. (American Journal of Obstetrics and Diseases of Women and Children, April, 1880.)

1881. Second Inaugural Address delivered before the New York Academy of Medicine, February 3d, 1881. New York: Printed for the Academy. 20 pp., 8vo.

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1881. Address on Behalf of Street Cleaning, April 13th, 1881.
1885. Valedictory Address as President of the New York Academy of Medicine.
1886. Influence of Maternal Impressions on the Fœtus.
1887. Address at the Opening of the New York Cancer Hospital, December 6th, 1887.
1890. Address at the Opening of the New York Academy of Medicine, January 17th.

A collection of Dr. Barker's papers was translated into German by P. Sprangenberg and published in Berlin in 1866. Another collection was translated into Italian by Alesandro Çamusso.

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Stated Meeting, November 19th, 1891.

ANNIVERSARY ADDRESS.

ARSENIC IN COMMON LIFE.

BY C. F. CHANDLER, PH.D.

[This address has unfortunately not been prepared for publication.—ED.]

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Stated Meeting, December 3d, 1891.

DRAINAGE WITH GAUZE PACKING

AS APPLIED TO THE UTERUS IN CHRONIC ENDOMETRITIS AND CHRONIC METRITIS, NOT ONLY WHEN THESE CONDITIONS EXIST INDEPENDENTLY OF SALPINGITIS OR OTHER FORMS OF PERIMETRITIS, BUT ALSO WHERE THEY ARE ASSOCIATED WITH SUCH DISORDERS—FORTY CASES.

By WILLIAM M. POLK, M.D.,

NEW YORK.

THIS rather long title is needed in order to define clearly the area I propose to cover. To those who are familiar with uterine disease it will seem to compass quite a number of the cases that come up for treatment, especially in our hospitals and dispensaries; and, in fact, it does, because among that class the causes producing the diseases in question are very common.

Drainage as applied to the uterus is an old subject, but, owing to a doubt of the efficacy of some of the methods tried, and a dread of the dangers involved in the application of others, it has not made much headway among the profession at large.

What I have to say here turns, then, less upon the principle of drainage as applied to the body of the uterus—the advisability of which all of us admit—than upon the manner of applying it. I will not stop to notice the several plans or methods that have been proposed in the past, because no one of them has sufficiently held the confidence of workers in gynæcology to induce its wide

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application. The mere fact that a certain line of procedure is successful in one man's hands is not necessarily a guarantee that it will be successful in the hands of other workers. So that it may be stated, almost as an axiom, that any procedure which can only be made successful in the hands of one or two operators is open to question. There can be no doubt but that some of our best workers are overcome, even to-day, by a dread of the interior of the non-pregnant uterus. This is seen in the guarded statements contained in Palmer's article * upon the treatment of chronic endometritis, and those made in the last edition of Thomas' work, just published. It is true that Dr. Thomas' associate, Dr. Mundé, joins issue upon this point, but even he, avowed advocate of intra-uterine medication as he is, possessed of as much experience as any of you, evidently feels that he is treading on dangerous ground in writing of the treatment appropriate to the inside of the non-parturient uterus.

One must not suppose that those of us who are firm believers in the great dangers which accompany all kinds of intra-uterine medication have dropped into this attitude upon insufficient evidence. Such is far from the truth, as any one may learn who will look into the society reports as found in the library. In addition to these evidences of danger, the consensus of the best opinion, even at the present day, is in favor of the extreme obstinacy of chronic inflammation of the body of the uterus, and some even go so far as to pronounce it, under conditions that are reasonably common, incurable. The aggressive spirit of modern gynæcology has not been idle in the face of opposition, and, in the case of chronic inflammation of the body of the uterus, it has tried again and again to alter the prognosis; but the results, in the main, appear to have confirmed rather than dispelled the belief, first, that intra-uterine medication is very dangerous; second, that even the best methods of

* Mann: "American System of Gynæcology."

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treatment alter but little the unfavorable prognosis that has always bestrode the disorder.

No one has a more profound respect for the carefully formed opinions of my predecessors than I, and I would never have dared invade the uterus as a matter of routine in treatment had it not been for the lessons learned in vaginal hysterectomy. If you can take out a uterus with comparative impunity, you ought to be able to invade its cavity with absolute impunity. I know of no special condition of the organ that forbids it. *It is only necessary in both operations that you should be scrupulously clean and provide for the escape of infecting material*—should any be present—by adequate drainage. The free use of gauze packing has been found to give the best drainage in all operations. Why not apply it to the cavity of the uterus?

This I have done in many instances, and the results have been so surprising to me that I again venture to urge it upon you. I have done it before, beginning with the New York Practitioners' Society in the spring of 1888,* continuing it before the American Gynæcological Society,† and now I repeat it as the result of a more extended experience, including a wider application, my last efforts being in the direction of chronic metritis and salpingitis.

The conditions to which the method has been applied include acute as well as chronic inflammation of the uterus and its appendages, parturient and non-pregnant; but in this paper I propose calling your attention to its use in the chronic inflammatory disorders only, such as:

1. Chronic endometritis.
2. Chronic metritis (subinvolution).
3. Chronic metritis with associated salpingitis.

The cases of endometritis have been dependent originally upon puerperal and gonorrhœal infection in the main, but some originated in stenosis, such as exists in

* New York Medical Record. † Transactions, 1888.

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retro- and anteflexions. That type of the disease known as endometritis fungosa, or hæmorrhagica, as some call it, was present in a fair proportion of the cases, quite enough to furnish a complete test of the efficiency of the plan of treatment adopted, and when the preliminary curetting was thoroughly done the results in all were as good as one could desire. If any class can be said to have proved stubborn, it was that which depended upon flexions, for in these permanency was only obtained by correcting the flexions by pessaries, as in the retrodisplacements, or by the Dudley operation, or the stem, as in the anteflexions. This, however, did not constitute an objection to the use of the packing, as these measures were subsidiary to it. The packing cured the endometritis more quickly than any other means ever employed by me, but the deformity of the uterus was dealt with either at the time or subsequently by operation, the pessary or the stem, as seemed indicated in the individual case.

The most striking results were obtained in chronic metritis, especially in the more common form known as subinvolution; and when one considers the therapeutic *modus operandi* of the packing, this is readily understood. The consideration of this same *modus operandi* will reconcile some sceptics to the use of the remedy in *chronic metritis with associated chronic salpingitis.* It is in this latter compound affection, however, that the greatest opposition is to be expected, because if there be one statement more strongly made than all others in works upon diseases of women, it is this: *In the presence of peri-uterine inflammation the interior of the uterus is not to be invaded*, and yet I must say that I find myself strongly at variance with this assertion.

It is to be hoped that no one will misunderstand me in reference to the treatment of chronic salpingitis, and infer, because I favor attacking the interior of the uterus in certain cases, that I oppose direct operation upon the appendages in appropriate cases. Such is far from being

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the attitude I maintain. I favor attacking the interior of the uterus in chronic metritis and endometritis, because by so doing we can prevent the extension of disease into sound appendages, and in the diseased tube modify the disease so as to limit the damage that may be done. This is of special value in cases where already one set of appendages are diseased and yet the other remains healthy—cases, in other words, in which at the present time, were we to open the abdomen, we would not only remove the diseased member, but the sound one as well, because experience teaches that in such cases the unaffected organs soon become diseased. This I believe to be solely due to the absence of efficient treatment of the interior of the uterus. I likewise favor this measure in the presence even of double chronic salpingitis, because there are some patients who, with a full knowledge of all the dangers and inconveniences of the disease, prefer to take their chances rather than submit to mutilation, and yet their condition is such as to demand treatment at our hands. In all such cases I have sought to allay any acute processes that might be at work outside the uterus by the routine treatment comprised in rest, saline purgatives, hot-water douches, and glycerinized cotton tampons; but with the subsidence of these processes, or in their absence, whenever the uterine body shows evidence of a persistent chronic inflammation either of lining membrane or walls, I have not hesitated to apply the method of treatment which furnishes the excuse for this paper.

The amount of depletion which the uterus suffers consequent upon this treatment is greater than that obtainable by any other plan I know of, and upon this depends the extraordinary efficiency which it has displayed when properly applied. This is clearly in the line of therapeutic action which all agree upon as essential for the cure of these cases; any further comment upon the *modus operandi* of the method would therefore be out of place before this audience. The question, however, that urges itself upon all of us is this: Is it dangerous; will it produce a peri-

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tonitis, a salpingitis? *Most certainly, if it is done improperly. Properly done, it will not.*

I present you in connection with this paper the temperature tracings of forty cases, and you can judge for yourselves as to the immediate effect of the treatment. Immediately after the operation there is slight elevation of temperature, and in cases in which uterine colic was pronounced the tracing remains high for twenty-four or thirty-six hours; it then subsides and remains down. I am aware that there are cases in which the tubes and even the peritoneum may become involved and yet the temperature curve be influenced but little. Yet even in such cases physical signs afford abundant evidence of any damage that may have occurred. In all my cases the most careful examination failed to show any inflammatory changes outside the uterus, except in the cases where peri-uterine masses existed prior to the operation, and in these the masses were lessened in size and the tenderness diminished or even abolished.

I beg leave to present at the end of this paper a synopsis of the histories of some of these patients. In one it will be noted that a laparotomy was done, and then the uterus was attacked. The charts cover several of these cases; they represent instances in which, having freed the appendages from all adhesions, or the ovary from a cyst, I attacked an associated metritis or endometritis at the same sitting.

In other cases trachelorrhaphy and perineorrhaphy were done all at the same sitting as the packing, this latter requiring but little time.

Packing the uterus with gauze is essentially an operation. Justified, however, by the certain relief of disorders which by other methods are acknowledged to be intractable and thought by some to be incurable, the evil sequences springing from the disorders in question are in themselves justification for even more ultra measures than are here proposed. This being clearly understood, the manner of procedure will be described as concisely as possible.

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First, as to the materials or instruments required. They are soap and water, solution bichloride 1 : 2000 and 1 : 500, a strip of sterilized cheese cloth the width of the index finger, containing about four thicknesses of the cloth—the whole about three feet long; a small can of sterilized cheese cloth; a large-sized cervical speculum with an interior diameter of about five-sixteenths of an inch (this diameter should be maintained from one end of the speculum to the other; the instrument should be straight, although a slight antero-posterior curve may not be objectionable; it should be provided with a plug, which, projecting from its further end, facilitates introduction); a Sims' tampon screw; a volsella forceps to fix and, when possible, draw down the uterus; a long dressing forceps; a Sims' or bivalve speculum; a good dilator, or a set of the hard-rubber dilators; a sharp curette; a fountain syringe with a glass-tube nozzle, or else a soft catheter of about the same size as the glass tube, say No. 8. To these I will add but one other essential, namely, an anæsthetic. In seventy-five per cent of all cases I believe general anæsthesia necessary; in twenty-five per cent, to be found chiefly among cases of subinvolution, the os internum is sufficiently open to admit of the procedure with the aid of local anæsthesia only.

The Operation.—Cleanse the vulva, the vaginal and the cervical canal, as if it were your intention to take out the uterus—which means that with soap and water and bichloride you must be thorough; now dilate the cervix so that you may introduce the speculum; then irrigate the interior of the uterus with bichloride 1 : 2000, keeping the cervical speculum in place while so doing, because it insures the return flow of the fluid as no uterine irrigator can; next use the sharp curette thoroughly over the entire surface of the uterine body, gauging the energy of your attack by the density of the walls as indicated by their resistance; repeat the washing with bichloride solution through the speculum as before. At the commencement of the anæsthetic you place the gauze (the

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strip as prepared for the interior of the uterus, and a good piece as it comes from the can) in the 1 : 500 bichloride solution; there it remains until you have completed the irrigation, which is made subsequent to the curetting; take it now from the solution and throw it into hot water in order to free it of the excess of the mercuric salt. Squeeze the strip dry, and then by means of the tampon screw carry it section by section through the cervical speculum into the uterine cavity, packing it firmly in place, first in one cornu, then in the other, until the excavation is filled down to the internal os. Then bring the end of the strip out into the vagina and coil it up against the cervix. Next squeeze dry a portion of the gauze left in the hot water, and place it loosely in the vagina. This completes the operation.

The subsequent treatment consists of rest in bed for a week; the use of a saline cathartic on the second day; hot fomentations over the suprapubic region if there be disturbing pain. The gauze is left undisturbed in the uterus until the sixth day, when, in case it has not been expelled by contractions, it is removed; a cleansing vaginal douche is then given, and the next day the patient is allowed to get up. As soon as she is sufficiently strengthened she is allowed to return to her usual avocation. As a rule but one packing is needed, but if another is desirable, as in certain cases of salpingitis or endometritis fungosa, it is made without anæsthesia at the time of withdrawal of the gauze, as the internal os is then well open.

A word as to the tampon screw and speculum. I use the screw because it can be better disengaged from the gauze than any other contrivance I have employed, a mere reversal of it being all that is needed to bring it out from any depth. The speculum is used, first to facilitate the irrigation, and then to facilitate the introduction of the gauze. The gauze will catch on tissue upon which mercuric solutions have been used; this the speculum obviates, so that it adds to the facility with which the pack-

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ing is applied. The plug which accompanies the speculum facilitates its introduction, as pointed out by Palmer, and serves no other purpose.

I cannot refrain from repeating what is said above touching the utility of the speculum in uterine irrigation. When in position it provides for the return of any fluid that may be introduced, provided this be done through a nozzle enough smaller than the lumen of the speculum. A No. 8 soft-rubber catheter or a glass tube of the same dimensions are the nozzles I employ, allowing the fluid to flow from a fountain syringe. I have never had a disagreeable experience with this form of irrigation, and I do not hesitate to pass as much as a pint of fluid into a three-inch uterus, if I consider it indicated, as in gonorrhœa.

The symptoms created by the process of packing are interesting because they show how extremely tolerant the cavity of the uterus really is, *provided drainage is maintained.* The temperature charts afford a fair indication of the amount of annoyance sustained by the several individuals, elevation of the curve coinciding with the suffering.

In general, it may be said that while patients differ in the matter of susceptibility to pain from the packing, the annoyance was insignificant, amounting in the majority of instances to about as much as the individual in question sustained at the menstrual epoch.

The amount of depletion sustained by the uterus is fairly represented by the degree of saturation of the gauze which is placed in the vagina. It varies, of course, with the extent of the bleeding which follows the curetting, but apart from this there is enough oozing of serous fluid, particularly in the cases of subinvolution, to assure one, not only of the completeness of the drainage, but upon the question of depletion as well. It is thorough, and therefore I have no hesitation in commending this plan of treatment to your consideration.

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APPENDIX.

CASE I.—E. M——, aged twenty-one; Germany; married; admitted October 12th, 1891. Gives a history of pelvic inflammation, beginning six months ago, and coming on after what was no doubt an induced abortion. She has had constant pain in the left iliac region, backache, and at times pains extending to left thigh. All of this pain is increased just before and during menstruation. There has been constant leucorrhœa. At the time of entrance to hospital the patient had been under treatment two weeks at the Bellevue Dispensary for chronic metritis (subinvolution) and chronic salpingitis. No special improvement had been noticed, although the usual course had been carefully carried out; the patient in consequence was placed in the hospital. Upon admission the entire uterine cavity measured four and a half inches. The organ was generally enlarged, sensitive, and partially fixed upon the left side. On this same side, the left, is a sensitive mass with dimensions that are about two-thirds those of the uterus; it is closely adherent to the uterus, and extends thence, in connection with the left broad ligament, toward the left pelvic wall. The physical evidence shows clearly that the case is one of chronic metritis (subinvolution) and salpingitis, and ample confirmation of this is obtained at the time of etherization.

October 19th. Under ether, the uterus is freely curetted, using the sharp instrument, and then packed with gauze.

October 26th. Uterus again packed, this time without anæsthetic, os being well open.

November 3d. Free from all discomfort. Uterus and mass lessened in size. No tenderness, even on firm pressure; canal three inches. Discharged at her own request, as she felt well and fully able to do her housework. (See temperature chart No. 27.)

CASE II.—C. K——, aged forty; married; Germany; admitted March 12th, 1891. Patient's history prior to entrance to hospital is imperfect. She says she has had pain in the right iliac region and has suffered some leucorrhœal discharge. Physical examination shows enlargement of the right ovary, enlargement and tenderness of the uterus, and a discharge from the cervical canal. It measures three and one-quarter inches.

April 13th. The abdomen was opened and the right

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ovary found to contain a cyst about the size of a pigeon's egg. In other respects the organ was healthy. The cyst was enucleated, the opening in the ovary closed with catgut. After closing the abdomen the uterus was curetted with the sharp curette and then packed with gauze.

May 16th. The patient was discharged cured. There was no discharge from the uterus, and its canal measured two and a half inches. (The temperature chart of this case has been lost. It presented no unusual feature, however.)

CASE III.—M. T——, aged twenty-three; single; Canada; nurse; admitted February 12th, 1891. The history is one of painful menstruation. In other respects her health is good. Bowels inclined to constipation. The ailment began eight years ago, and, with varying intensity, has continued up to her last menstruation, two weeks ago. There is a great deal of pain at the beginning of the flow; this continues for three days, growing gradually less. The flow lasts five days, coming away with difficulty; much of it in the shape of clotted blood. In the intervals of the menstruation, which is regular, she has backache, and for two years past has had slight leucorrhœa.

The uterus is anteflexed, its body enlarged and tender; the sound shows that the tenderness is chiefly in the cavity; this is enlarged and measures three inches. The appendages are normal, so far as physical examination under ether can show.

February 14th. The patient being under ether, the uterine canal was dilated, curetted, and packed with gauze. The operation devised by Prof. E. C. Dudley, of Chicago, for straightening the canal, was then performed.

February 27th. The patient was discharged in good condition.

December 28th. The patient was examined to day; the canal was well open and straight. She had had no return of the dysmenorrhœa and considered herself well. (See temperature chart No. 35.)

CASE IV.—L. W——, aged twenty-two; Germany; single; domestic; admitted October 31st, 1891. The history of the case is that of miscarriage at five months, eight weeks ago. Up to this time health in all respects had been excellent. She has been flowing almost constantly since the miscarriage. Her appearance bears out this statement, as marked anæmia is present. The uterus is ten-

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der and large, measuring three and a quarter inches. Blood flows freely from the canal as the sound is withdrawn. The appendages are normal.

November 2d. The uterus was curetted and packed.

November 8th. Canal two and three-quarter inches. No tenderness in or about the uterus. Discharged.

December 2d. Reports herself as well; last menstruation normal. Canal two and one-half inches. No tenderness in or about the uterus. (See temperature chart No. 32.)

TABLE OF CASES SHOWING HIGHEST TEMPERATURE REACHED TWO DAYS BEFORE, ON THE DAY OF, AND ELEVEN DAYS AFTER OPERATION.

Case	2d	1st.	Oper.	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	
1	98.6	98.2	99.2	99.2	98.5	99.	c. n.								
2	98.2	99.2	98.6	99.6	99.	99.2	98.9	99.	98.4	99.9	99.4	c. n.	...	... ..	
3	98.2	99.2	99.2	100.4	99.2	99.8	98.6	98.4	99.8	99.7	99.2	99.4	98 4	c. n.	
4	....	99.4	101.4	100.9	100.4	100.6	100.2	100.	99.6	99.8	99.2	98.8	99.2	99.2	c. n.
5	.	98.8	99.1	99.3	99.8	100.2	100.	99.3	99.2	99.8	99.7	99.6	99 4	99.	c. n.
6	100.8	100.6	100 6	101.3	100.6	100.3	100.6	99.6	98.4	98 8	98.8	98.7	98.6	c. n.	
7	99.4	99.	100.2	100.	99.9	99.4	99 3	99.2	99.	99.2	99.	98.4	c. n.	. ....	
8	...	98.5	98 7	98 9	99.	99.	98.8	98.7	98.8	98.7	98.5	98.6	c. n.	.....	c. n.
9	100.2	99.3	99.8	100 4	100 6	100.	100.1	102.	99.8	99.4	99.4	99.	99.	99.	98.4
10	98.4	99.2	99.1	99.	98.9	98.6	98.8	98.8	98.8	98.4	98.2	98.2	98.4	c. n.	
11	99	99.2	98 6	99.	98.8	99.4	99.4	99.2	99.	98.8	98.6	98.6	98.6	.....	
12	99.2	99.	98.9	99.4	99.3	98.8	98.6	97.8	98.	98.	98.	c. n	.....	.....	
13	98	98.	98.4	98.4	98.7	98.4	98.4	98.4	c. n.	.....	.....	.....	..	.....	
14	99.4	99 2	98.2	99.8	99.6	100.	99.4	99.9	99.8	99.2	99.3	99.4	98.6	c. n.	
15	98.7	99.	98.4	99.	99.6	98.8	98 6	98.4	98.2	98.2	98.2	c. n.	.....	... ..	
16	99.4	99 4	99.6	99.4	99.6	99.8	99.8	99.6	99.2	99.	98.4	98.4	98.8	98.4	
17	98.8	98.7	99.4	99.6	99.5	99.	98.4	98.4	98.3	98.6	99.	98.4	.....	.....	
18	98.4	98.5	98.5	99.	99.5	99 4	99.6	99.2	99.1	99 2	99.1	98.8	98.9	98.4	
19	98.	98.6	100.8	99 6	99 2	98 8	98.4	98.4	98.8	98.7	98.4	98.8	99.	98.4	c. n.
20	99.2	99.3	100.6	100.	99.6	100.	99.4	99.2	99.4	99.	99.1	99.1	99 2	c. n.	
21	99.4	99.4	99.5	100.	100.1	100.8	100.8	100.4	100.4	100.4	99.8	99.4	99.	98.6	
22	99	99	99.	100.8	100.6	98.1	98.4	98.2	98.8	98.8	98.8	98.8	.... .	.....	
23	....	98.6	99.6	99.6	99.6	99.4	100.6	99.8	99.4	98.1	100.4	100.	99.8	99.	98.9
24	98.2	99.	99.8	99.2	99.6	100.2	99.9	99.8	98.2	98.2	.... .	..	.....	.	..
25	99.6	99.4	100 3	99.2	98 8	99.	98.6	98.8	99.	98.8	101.2	100.	99.4	98.7	98.8
26	...	99.4	99.6	101.8	100.1	100.	99.8	98.9	98.8	98.4	dis.	. ...		.....	
27	101 4	100.4	98.8	99.	99.4	99.	98 4	98.4	99.	99.2	99.8	99 4	99.6	99.2	99.8
28	98.9	99.	99.	99.7	99.1	100.2	99.2	100.	100.1	100.8	100.	98.4	99.	98.4	
29	....	99.4	100.2	99.4	99.4	99	98.4	98.3	99 3	98.2	98.3	98 3	98.	.....	
30	...	...	99.4	100.2	100.	99.2	99.2	99.2	99.2	99.	98.8	99.	98.8	dis.	
31	....	...	100.2	99.4	99.4	99.4	99 8	99.8	98.2	98.2	98 8	98.4	98.2	98.8	
32	....	99.	100.4	100.2	100.1	100.	99.6	99.6	99.4	100.2	99.	98.4	99.4	99.4	
33	....	98.6	98 6	99.2	98.8	98.9	99.6	99.	98.8	98.4	op.	100 4	100.2	99.2	99.5
34	98.	98.9	98.5	98.7	99.4	98.6	98.6	98.6	98.6	98.5	98.5	98.6	98.5	... .	
35	98.7	98 6	98.8	100.	100.	99.6	99.5	99.6	99.	98.6	98.6	99.	98.8	98.6	
36	.	99.8	100.	100.6	100.9	99 6	99.6	100 5	99.6	99.2	98.6	98.8	98.6	98.6	
37	99.	100.2	104.2	101.2	99.8	100.1	99.8	99.	99.5	99.6	99.5	99.5	99.5	.....	
38	99.4	99.3	100.	100.9	101.4	100.4	99.4	99.	98.8	98.4	98.4	.....	.....	.....	
39	98.5	98.5	98.5	98.3	98.5	98 4	98.6	98.5	98.6	98.	97.8	98.2	98.2	.....	
40	99.	99.8	100.2	100.	99.2	99.4	99.6	98.	98.5	c. n.	.....	.....	.. ..	. ....	

NOTE.—Case 25. On the 15th day temperature was 102.5, but was normal, and continued so after 18th day.—The report of one case was mislaid.—Shortest time in hospital, 11 days, longest time, 51 days; average time, 18½ days.—c. n. = continued normal.

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DISCUSSION.

DR. W. T. LUSK, being invited to open the discussion, said that he had had no experience with the method described by Dr. Polk, but that he meant to give it a trial. Of course, he had been for many years an ardent advocate of the principle of drainage. Any one who had seen the beneficial results of even simple dilatation of the cervix in cases of catarrh of the cervix and interior of the uterus, would be prepared to believe at once in the success of the method practised by the author. When inflammation developed within the uterus it could not be cured as long as the lining membrane was constantly bathed in unhealthy secretions. The first necessity was to cleanse the cavity and keep it clean, and to do that dilatation was necessary. As previously stated, he had seen excellent results from dilatation, curetting, and application of compound tincture of iodine to the uterine cavity. Indeed, from such treatment he had seen many cases of tubal disease get well, which led him to think that in many instances tubal disease was due to simply damming-up secretions at the cervix. Many years ago Dr. Ball, of Brooklyn, went to a number of medical journals to have printed an article describing the use of a steel dilator for the cervix; his article was not accepted until he came to Dr. Lusk, who printed it in *The New York Medical Journal.* But forcible dilatation at that time met with general condemnation. He often wondered why a procedure which then was said to produce metritis, peritonitis, etc., could now be practised with as little risk as attended the filling of a carious tooth.

DR. C. C. LEE had practised curetting and drainage of the uterus, but in cases where he had removed submucous fibroids, or where the patient had had an abortion, etc., and in a manner somewhat different from that described in the paper. On looking over his records he had also found over forty cases of endometritis so treated during the past three or four years. He divulsed, and used all the antiseptic precautions named by Dr. Polk, except that he injected simply hot water instead of bichloride into the uterus. Instead of inserting gauze, he put in a glass tube for a drain, leaving it in ten days.

DR. W. GILL WYLIE said that dilatation and drainage of the uterus, if not by gauze, yet by some other means, had been taught and practised at least twice a week for the

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past eight years at the Polyclinic. Thus uterine drainage was certainly known to more than two thousand of the younger men scattered throughout the States. Essentially the same speculum shown by the author had been used at the Woman's Hospital about twenty years ago, but that one was too large to enter the canal except in cases of subinvolution, and in them simple curetting and irrigation would answer without special means for drainage. But in cases of imperfect development of the uterus, with dysmenorrhœa, sterility, endometritis, etc., the internal os could not be dilated sufficiently to let the speculum enter, or for the introduction of gauze. The statement made by some authors that the internal os could be dilated an inch and a half or an inch and a quarter was erroneous; it would tear first. In such cases of chronic endometritis he had tried various instruments for drainage, but had put all aside for the hard-rubber tube with a slight bulb on the upper end to hold it in place, and which, placed in hot water, could be bent into the desired shape. If there were any acute symptoms, as fever, in cases of uterine disease complicated with tubal enlargement, the method should not be practised. Again, he would not use the curette in a large, soft uterus until he had reduced it in size by preliminary treatment. It was easy to pass the curette through the walls of the uterus in such cases. Thus he would advocate drainage, but in a modified way. In some cases the curetting, cleansing, and drainage would prove only of temporary benefit—why, he could not say.

DR. GEORGE M. EDEBOHLS resorted to divulsion and thorough curetting without drainage, and was thus enabled to cure cases of endometritis without salpingitis, as indicated by the absence of enlargement or sensitiveness of the tubes on palpation. But where there was associated salpingitis something more would be called for —that is, the curetting should be followed by drainage; and of the various modes of drainage which had been proposed, he thought the one described by Dr. Polk would prove the most thorough. He thought there was no danger in invading the uterine cavity if one observed perfect asepsis and gave free exit to the secretions subsequently; and when there was disease of the appendages, or even pyosalpinx, the operation was not serious, provided the condition was recognized and undue mechanical insult was not offered in pulling down the uterus, etc.

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He had practised drainage of the uterus in three cases of pyosalpinx with recurrent attacks of pelvic peritonitis, in which the tubes would empty themselves through the uterus and fill again from time to time, being convinced that the obstruction was at the os internum and not at the uterine end of the tube; he introduced Outerbridge's speculum through the internal os, and left it in a month or two. The girls had no further trouble and considered themselves well, the last one having been treated as long ago as a year. This therapeusis should, of course, only be tried in cases in which the collection of pus in either tube is probably one-chambered, and in which the normal relations between the position of the uterus and of the tubes are preserved.

DR. FLORIAN KRUG regarded the treatment described in the paper as pre-eminently surgical, and therefore sound and sensible. Gynæcology was too much handicapped by rules of treatment laid down in the pre-aseptic period. In endometritis the uterine cavity should be looked upon as an abscess cavity and be treated in the same way. It had been his custom for three years to treat those cases by dilating the cervix, curetting the interior of the uterus, and introducing iodoform gauze, in private as well as hospital practice, taking due antiseptic precautions by cleansing the vagina and uterus. He thought it was well that a warning should be sounded to those who were in the habit of applying nitric acid, strong currents of electricity, and all sorts of caustics to the interior of the uterus, without having made thorough dilatation and given all chance of egress of secretions.

DR. T. A. EMMET said that twenty-five or thirty years ago he treated cases of subinvolution and endometritis by dilating the cervix with tents, leaving them in for a day or two for drainage, and then throwing in hot water until the uterus contracted, and in a large number of cases the effects for a time were admirable. True, he lost a patient now and then, and he did not know why. Gradually he gave up the practice, as his patients did not remain cured, and although he realized the fact that the subinvolution could almost always be cured by an operation on the cervix which had been lacerated. He thought, however, that the treatment recommended in the paper had a field of usefulness in cases where the tube was discharging pus into the uterus. He had been trying to apply the general principle in such cases for the

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past year or two, and although he had not met with much success, yet he thought it deserved a fair trial. He believed that in many cases the pyosalpinx was cured by the pus escaping through the uterus into the vagina, and the walls of the tubes then becoming adherent to one another, and in the same way that any other abscess cavity disappeared.

As to endometritis and chronic metritis, so-called, he would be very glad if some one would tell him what those diseases were if existing unconnected with the puerperal state, or to demonstrate their existence after death in the dead-house. He had been unable to find any such condition by autopsy, although he had often looked for it. He could not understand how an inflammation of the lining membrane above the internal os could exist in a woman who menstruated, for there was no true mucous membrane above that point, and a drop of menstrual blood placed under the field of a microscope showed so great a destruction of cells at that time, which had to be speedily reproduced, that in the process of repair an endometritis could not exist beyond a menstrual period. An inflammation of the mucous membrane could, of course, exist below the internal os; and it generally did so in connection with a laceration of the cervix and could be easily cured. But it seemed an impossibility that the condition recognized as metritis in connection with the puerperal state could exist under any other circumstances, and the term "chronic metritis" indicated a condition which could not exist, in his opinion, or, if so, it ought to be easy of demonstration after death. He no longer made an application, or even passed a sound into the uterus, unless there were a new growth or some injury caused by parturition. He could not imagine an unmarried woman having any such condition of the uterus above the internal os, unless there existed a new growth which could require direct treatment.

When a hypersecretion existed it indicated a new growth or some pelvic inflammation outside of the uterus itself, and was a symptom and not the disease. Good results might be obtained from making applications, in so-called endometritis, to the cavity of the uterus, as there could be no better absorbing surface; but the risk was much greater in thus treating a pelvic inflammation, and better results could be gained if the applications of iodine were made only within the vagina. He believed

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the disease was not above the internal os, and the subinvolution would not be permanently removed by the treatment proposed, but the hypertrophy would return unless other measures were resorted to.

DR. H. J. GARRIGUES objected to the use of bichloride of mercury, and recommended one per cent creolin, which was antiseptic, not poisonous, and had further advantages in being slippery and somewhat hæmostatic. He also showed a forceps which could be introduced up to the fundus, and took the place of a cervical speculum when one did not wish to dilate. Electricity could be used without dilating the cervix, and do no harm, for the reason that it was itself an antiseptic.

DR. POLK closed the discussion. He did not doubt that creolin was just as good an antiseptic as bichloride for this purpose, but the latter applied as here done, and to so small a surface, could not cause symptoms of poisoning. Regarding the use of the term "endometritis," he employed it in the sense it was used in the text books. Replying to Dr. Wylie, he said he claimed no novelty in the cervical speculum employed, and he supposed even Dr. Wylie would not claim priority as to the principle involved in the mechanism of a speculum. Regarding his charge that the speculum and gauze could not be introduced except where there was subinvolution, he did not doubt that from Dr. Wylie's standpoint they could not; but if Dr. Wylie would come to his ward he would demonstrate to him that, from a clinical standpoint, they certainly could. And as to the principle of drainage having been first taught at the Polyclinic, that could not be, for this principle was as old as the speakers themselves.

DR. WYLIE.—I was referring to the practice.

DR. POLK.—And you say you have been trying to get the profession to adopt your mode of applying drainage for fourteen years? Now try mine, and if you do not accomplish anything at the end of three, I will give you the right to denounce it heartily.

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Stated Meeting, December 17th, 1891.*

DISCUSSION ON STREPTOCOCCUS OSTEOMYELITIS IN CHILDREN.

Opened by HENRY KOPLIK, M.D., and W. W. VAN ARSDALE, M.D., of New York.

I. ETIOLOGY.

BY HENRY KOPLIK, M.D.

THE class of cases dealt with in the investigations to be spoken of in this paper are not uncommon, nor do they appear here for the first time. They are scattered throughout medical literature. Strange to say, it is not until a comparatively recent date that we can note any attempt to describe and classify them under a heading in accord with our modern views and ideas. The etiology of the cases included in this paper has been variously linked with sepsis, pyæmia, and the vague term of infection. It would seem at the present day that we could sift a satisfactory conception of sepsis or pyæmia from the immense mass of accumulated work, both experimental and speculative, of our literature. On the contrary, our work in this direction is still formulating. The most original minds have hesitated to reject previous theories, and refrained from inventing new formulæ in order not to make apparent confusion still greater. This state of affairs arises from the great difficulty encountered when we attempt to apply the experimental results obtained in animals to the human subject. Robert Koch, in his classic brochure upon wound infection, has hesitated to introduce new terms into our nomenclature. In doing so

* In charge of Section on General Surgery.

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he has simplified to a very great extent the application of sepsis and pyæmia. He retains the early definitions of Davaine. Septicæmia and pyæmia will thus include all diseases the result of any wound infection. Septicæmia is a term which he applies to all cases of general traumatic infection in which no metastatic deposits occur. Pyæmia is applied to those diseases in the course of which these may be present. Confusion had hitherto resulted from a variety of conceptions upon the nature of sepsis and septicæmia, which included the active co-operation of some putrid matter and its introduction into the circulation. Thus we have the term sapræmia (Matthews Duncan). Cohnheim and Birch-Hirschfeld have also appealed to this active element of intoxication in cases of septicæmia and pyæmia.

With the development of our ideas upon the processes named above, we have not as yet eradicated the traces left by former work. Koch indicated that the line between septicæmia and pyæmia was not so very distinct as some were apt to suppose. For in some cases of septicæmia we may find microscopic metastases identical with those found in pyæmia. Babes insists that sapræmia is but a variety of sepsis. Rosenbach includes under his classification of sepsis, first, a form in which the organism is invaded by a ptomaine without the presence of micro-organisms in the blood (sapræmia of Ogston, Duncan). The second form includes a bacterial invasion. His conception of pyæmia is not materially different from that described above. The definition of Gussenbauer, that pyæmia is a general infection resulting from the reception into the circulation of the elements of infected pus, is of passing interest in this connection. Nor can we at the present day feel entirely satisfied with that part of Rosenbach's definition of pyæmia which assumes two forms of this condition—one in which a very marked focus of suppuration has preceded, another in which a small focus of insignificant area has pre-existed. Inasmuch as the symptoms of both these forms may differ

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in severity at times, in other cases this may not be so. It is not surprising to find, therefore, that another term has crept into the literature. In order to group a class of cases which might present symptoms and conditions common to both septicæmia and pyæmia, we have been given the term septico-pyæmia. Ogston maintained that septicæmia, pyæmia, and septico-pyæmia were one and the same disease, due to micrococcus infection. The forms of septico-pyæmia dealt with in this paper are those cases met with in infants and children. They have followed an infection through a wound in the cutaneous or mucous surfaces, at the umbilicus, or elsewhere. They may follow the absorption of micro-organisms through wounds left by the infectious processes of diphtheria, scarlet fever, measles, or they may follow a pneumonia or empyema. Study has been directed especially to that class of cases in which a certain manifestation of this infection becomes the chief care of the physician and surgeon. The cases referred to are those septico-pyæmias resulting exclusively in arthritic symptoms, joint suppurations, bone infections. It may be repeated with pardonable emphasis that these cases are really traumatic wound infections in the sense enunciated by R. Koch. We find in the early literature of these cases that Orth, in 1872, supposed that those diseases of the new-born connected with puerperal fever were a "mycosis septica." Weigert, at the time, described an umbilical ulcer in one of these cases as covered with micrococci. The study of joint suppurations in infants, following infections and infectious diseases, is so linked with the immense literature upon sepsis of infants that to merely sift the cases of joint suppurations would probably alone occupy the extent generally given to a historical brochure. The masterly lectures of Max Runge upon "Diseases of the New-born" contain cases of his own of joint suppurations, and many references to literature of exhaustive nature. I will refer the reader to Runge's work, and satisfy myself with a few very marked

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examples as they strike the reader of the later literature.

J. Abercrombie presented to the Pathological Society of London in 1881 a shoulder joint which was one of several infected articulations in a child that had suffered from empyema following measles. In this case the joints were disorganized and the bones necrotic. H. Ashbey collected five hundred cases of scarlet fever, in twelve of which joint complications occurred. In two of these twelve cases there was what the author calls purulent synovitis. Litten comments upon these purulent joint complications of scarlet fever. He examined at this time the pus taken from some of these joints, and found cocci and bacilli. In some there was no change in the cartilages, in others erosion, and in others separation of the epiphyses. A little later than this Brieger, who began to agitate the doctrine of mixed infections, examined the knee joints of cases of infection of a puerperal nature, and found micro-organisms (staphylococci and streptococci) in the pus of the affected joints. He brought to the foreground the theory that in the acute infectious diseases the soil was prepared for the invasion of pus-generating microbes. This, with the investigations of Löffler, who first demonstrated these mixed infections in diphtheria, has an important bearing on a full understanding of these cases, as will be seen from what follows in this study. J. H. Morgan also presented to the Pathological Society of London the case of an infant, four weeks old, with multiple articular suppurations. He classified the case as pyæmia, but did not apparently go any further. Hochsinger relates a case of supposed umbilical infection in which no other history could be definitely established. This infant, twelve days old, presented multiple joint suppurations. Hochsinger found streptococci in the pus of the joints. When Löffler, in the course of his studies upon diphtheria, isolated a streptococcus which caused peculiar joint suppurations when injected into the circulation of rabbits, Heubner published a case in which

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joint suppurations followed scarlet fever. Heubner examined the pus in the joints of his case, using cover-glass stainings only. He found a chain coccus, which he assumed was possibly identical with the chain coccus described by Löffler (Streptococcus articulorum). From the above scattered notices it can be seen how clinicians began gradually to seek a cause for these serious, and at times fatal, suppurations of joints, other than the hitherto accepted but vague term of pyæmia, or, as formerly, even the term of rheumatic joint. Strange as the assertion may appear, it is impossible to come away from the study of the work upon the class of cases named in this paper without the impression that attention was diverted from a true appreciation of the exact nature of joint suppurations in this class of septico-pyæmias by a false interpretation given to the classical work of Rosenbach, Becker, and Struck upon osteomyelitis. The class of cases and their complications included in this paper will be shown to be really cases of osteomyelitis, but an osteomyelitis due to a different micro-organism than that which engaged general attention in the early history of this bone disease. The first idea of a specific osteomyelitic microbe seemed to pervade all work at this time. If we compare the work of Krause in Volkmann's clinic with that of Lannelongue, Achard, Courmount, and Jaboulay, we see how all these authors were working upon exactly similar cases, but making diverse conclusions. The gradual overthrow of the doctrine of a specific osteomyelitic coccus marks the turning point in the explanation of joint suppurations and bone affections in the class of cases of which we write. The work of the French school in this field is both classical and convincing. Lannelongue, Achard, and others have proved that not only the staphylococcus isolated by Rosenbach may cause osteomyelitis, but streptococci, as also various other pus-producing micro-organisms. I need only point to the recent contribution of Lannelongue and Achard in

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the *Annals of the Pasteur Institute* to convince the most sceptical upon these points.

Lannelongue and Achard began their work by a discovery of chain cocci in the suppurating joints of infants the victims of puerperal infection. They finally proved the capabilities of this chain coccus in the production of osteomyelitis. These chain cocci, as will be seen, were long known to exist in the pus of these joints. Krause, among others, had proven their existence by modern culture methods; but there is in this latter work the same hesitancy to fill up an unexplained space in the bacteriology of these cases. The life history of the development of our ideas on the subject of osteomyelitis proceeded along two very distinct lines, and the immense literature can be very much simplified if we keep this in mind in our study. The earlier studies were confined almost exclusively to those forms of this disease which were caused by the micro-organism first called by Billroth the staphylococcus, a term adopted by Ogston, Schüller, Nepveu, Rosenbach. The later studies were confined to the peculiar conditions under which the streptococcus, or chain coccus, could cause the same acute disease. Finally, to-day we have the union of ideas in the doctrine that any pus-producing microbe, even the pneumococcus of Fränkel, may be an active agent in the production of acute osteomyelitis. The universal influence of Pasteur is noticed in the early history of this disease. He, in 1880, identified the staphylococcus already described by Lücke, Klebs, Eberth in foci of infectious osteomyelitis, as identical with the microbe found in ordinary furuncle. Following upon this we have the work of Becker and Struck, and the classical brochure of Rosenbach, upon the osteomyelitis due to the active agency of the Staphylococcus pyogenes. The work of Rosenbach influences very greatly subsequent work in this direction. Though Rosenbach found in rare cases the staphylococcus associated with the streptococcus, he did not award to the latter microbe the dignity in the causation of osteomyelitis that he did to the former. He

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seemed to regard the streptococcus more in the light of a mixed infection. Rosenbach stopped here. The work of subsequent authors, instead of attempting to enlarge that of Rosenbach, rather attempted to narrow it down to an application which could scarcely have been intended by the author. Some investigators seemed imbued with the idea that the staphylococcus of Rosenbach must be regarded as the only causal agent in acute osteomyelitis. This fixed idea seemed to cloud all their work. F. Krause, working at the time in Volkmann's clinic, investigated a number of suppurating joints, as also cases of osteomyelitis. Krause found in a number of suppurating joints, accompanied by destructive processes of the heads of the bones, streptococci. He also found staphylococci in foci of osteomyelitis. Rejecting the cases which showed streptococci as pyæmic or septic, he directed most of his attention to certain micrococci which he regarded as identical with those isolated by Becker and Struck. He made some experiments in which an attempt to obtain artificial osteomyelitis without traumatism, but simply the injection of the above organism into the circulation, failed. He obtained the results published by Becker and Struck by inflicting traumatism and obtaining subsequent osteomyelitis in an infected animal. We know now that these organisms experimented with early in the history of osteomyelitis were probably staphylococci indentical with those isolated by Pasteur. Yet the color of a specific microbe given to the subject of acute osteomyelitis by Becker and Struck was not without great influence. Garré corroborated the work of Rosenbach and Müller later, and maintained the presence of the staphylococcus in cases of epiphysary osteomyelitis. Kraske has intimated that in certain cases of osteomyelitis there is a mixed infection, and that future investigations might show that every micro-organism capable of producing suppuration could produce osteomyelitis. He mentioned intestinal mycosis also as a source of infection. The history of the study of osteomyelitis due to streptococci (Streptococcus pyo-

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genes) is most interesting, inasmuch as it is so closely connected with the class of cases upon which this paper is constructed.

These cases have certainly been the subject of study from the time of Pasteur's first publication to the present day. Rosenbach found streptococci in suppurating joints and in bones. He attributed to this organism great destructive powers, and metastatic properties which were not possessed by the staphylococcus. Later on Krause, as mentioned above, also isolated streptococci from the pus of suppurating joints in cases similar to those subsequently studied by Lannelongue and Achard. I have mentioned above the work of Brieger, Litten, Hochsinger, Heubner, to show that these cases were being actively studied over an extended period of time. We owe to the French school the best work upon this division of the subject of osteomyelitis. Though Garré attributed to the Streptococcus pyogenes the power of producing acute osteomyelitis, and denied that there was any specific microbic influence in this disease, it must be conceded that these ideas were developed experimentally more satisfactorily than hitherto by Lannelongue and Achard, and also Courmount, Jaboulay, and Rodet. It had been demonstrated by Löffler, Babes, Marie Raskin that the streptococcus existed in certain affections as a constant, though perhaps adventitious, quantity. It was strongly influential in causing lesions which resulted from the secondary invasion of the economy by this microbe. Babes, in his very convincing work upon septic processes in children following scarlet fever, diphtheria, etc., found the streptococcus in the spleen, kidneys, and other organs. Lannelongue and Achard not only found these streptococci in joints of children the victims of infection after birth or infectious diseases, but, with Courmount, Rodet, Jaboulay, turned their attention to the manner of action of these micro-organisms in a series of animal experiments. Lannelongue and Achard have but recently, in the *Annals of the Pasteur Institute*, proved to their entire satisfaction that not only

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could the Staphylococcus pyogenes aureus and albus produce osteomyelitis, but also the Streptococcus pyogenes and the Diplococcus pneumoniæ of Fränkel and Weichselbaum. These authors succeeded in producing experimental osteomyelitis, without previous traumatism, with the staphylococcus and streptococcus, a fact not hitherto generally admitted by all authors.

CASE I.—*Septico-pyæmia; joint suppurations; Streptococcus osteomyelitis.*

January 26th, 1891. Female infant, aged two weeks; mother had had repeated abortions, and was under treatment, for decidual endometritis, with a mixture of biniodide of mercury. Infant, when born and during subsequent week, had all the appearance of a well-developed, healthy infant. No eruption of any kind. The umbilical wound did not heal; it became red and inflamed about a week after birth. Ordinary zinc ointment was applied by pyrents. The nurse, after a few days, noticed at the bath that the infant had pain in the right lower extremity; later on the knee became swollen and painful.

Status.—Well-nourished infant, weighing eight pounds; skin of a very healthy hue; no eruption about face, mouth, genitals, or any part of the body suggestive of syphilis; no rachitis (congenital). The right knee is swollen, fusiform in shape, fluctuating; great pain on manipulation; no other joint affected. Temperature 102°; bowels correct.

Umbilicus presents a suppurating wound, and its vicinity is of a livid red hue; indurated, cord-like structure could be felt running under the skin to the pubes. This was supposed at the time to be the inflamed vein. A needle introduced into the joint withdrew a thin, dirty-yellow pus. At operation (incision and introduction of drain) half an ounce of the same pus was evacuated.

29th. Apparent improvement, less swelling about the joint, less pus. The lividity of the umbilicus has disappeared, but the umbilical wound is still suppurating.

February 2d. Discharge of the affected knee less; baby is restless, does not sleep; left knee is now painful, but no swelling or fluctuation. Rectal temperature 101°; bowels correct and normal; general appearance good.

15th. The above temporary improvement has given way to a decided change for the worse; marked pallor and

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weakness present. There is a swelling alongside of the left knee, also one in front over the femoral artery. Exploration alongside of knee with needle withdrew serum; this, bacterioscopically, contained nothing. The hip joint opened by an incision in front, over the most prominent part of the femoral swelling; pus evacuated. The joint found involved. Temperature 100°–100½°; pulse 150 at times.

21st. Infant pale and much weaker; fluctuation and swelling underneath the left mammary gland opened, and found to contain pus. It was established at subsequent examinations that this pus had burrowed along the muscular planes from a mediastinal abscess resulting from a suppuration of a costo-sternal articulation. The probe touched exposed bone at one point. This mediastinal abscess at times simulated effusion in the pericardial region when accumulation occurred; this disappeared with discharge of pus.

March 21st. Infant has steadily lost ground. Knee, hip, and mediastinal suppurations progressing. Temperature low, ranging from 100°–100½°; pulse 120–150. Knee on 22d opened freely; heads of bones found disorganized and necrotic. Hip opened with incision for resection; head and neck of femur entirely destroyed; great trochanter found in a necrotic state. Trochanter removed and drains inserted. Abscess of chest opened, and it was found that a sinus led from the mammary region to the mediastinal aspect of the sixth costo-sternal articulation. Sudden death two days subsequently. At no time could disease of the lungs, heart, or other organs be established. Urine contained no casts or albumin.

CASE II. *Scarlet fever; streptococcus invasion; Streptococcus osteomyelitis manifested by multiple joint suppurations.*—Female, aged two years; Russian parentage.

January 27th, 1891. Two weeks ago child brought to the dispensary with scarlet fever; returns to-day. Mother says that she noticed the child had swellings in the joints; no other history; people very ignorant and can give no connected data.

Status.—Child pale; surface of the skin puffy, whitish; there is active desquamation; lips fissured; temperature 101°. The left hand is much swollen from the wrist down over the dorsal surface of the hand. Skin bluish and œdematous. Swelling includes the wrist down to the metatarso-phalangeal joints. The ring finger of the right

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hand also swollen at the first phalangeal joint; skin here much thinned, red, and at most prominent point yellowish. Needle introduced into wrist and other joints; a thick, white, creamy pus withdrawn. Heads of the bones found bare and necrotic, grating against the probe and each other. Incision and drainage.

31st. Temperature 102°. Moderate amount of discharge from the joints; no other joints involved; complete disorganization of wrist and finger joints; bones forming joints grate against each other when moved.

February 2d. Right elbow opened; pus discharged; left elbow swollen, but on account of bad general condition of patient the joint was not opened.

5th. Right elbow discharging; the radial and ulnar joint involved. There is now general anasarca and fever. Joints again examined and complete disorganization found in the joints of the ring finger of the right hand. Broncho-pneumonia, which was established January 31st, has progressed, involving lower lobe of the left lung. Urine contains no casts, but large numbers of leucocytes and albumin.

9th. Left elbow opened and pus evacuated; temperature 103°; pulse rapid and feeble; urine as above; general anasarca.

10th. Death. No autopsy.

CASE III.—Female infant, aged ten months; Russian.

May 7th, 1891. Patient became ill four weeks ago with fever and slight cough; the parents say that there was flushing of the face at this time, but there is no distinct history of a rash. Later, the baby brought to me; broncho-pneumonia found. A few days ago the mother noticed swelling of the wrist and elbow. The cough and dyspnœa increased.

Status.—Infant pale, emaciated, and suffering dyspnœa. Examination of the chest shows a broncho-pneumonia on the right side of the chest, middle and lower regions of the lung. The right wrist is swollen, red and painful, and fluctuating. Wrist aspirated, and a yellowish-green pus removed. Incision; drainage; temperature 103°; pulse 145; respirations as above.

9th. Temperature 104°; pulse 160; dyspnœa. No fluid in the chest (at least as shown by needle). Discharge from the wrist is sero-purulent. Joints probably disorganized. There is œdema of the hand, and the elbow is swollen and red. No fluid in the joints.

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18th. Temperature 102° to 104°; pulse 168. Baby is pale, prostrated; respirations 48. Evident dyspnœa. Needle introduced into chest and a serous fluid withdrawn from right side. Joints as follows: The wrist joint is not only mobile and completely disorganized, but the epiphysis of the radius seems to be separated. The elbow shows increased mobility of the bones and probable separation of the radial epiphysis. Discharge from the joints slight but continuous. Elbow joint suppurating. The shoulder joint on the same side a little swollen.

June 1st. The patient having recovered from the broncho-pneumonia, and the effusion in the chest having disappeared, it was deemed safe and advisable to perform an operation for the evident osteomyelitis of the radius. The wrist and elbow joint opened; the radius found lying in a groove of tissues denuded of periosteum. The radius removed entire. No trace of periosteum evident; nothing but a granulating groove found in which the bone lay. The patient made an excellent recovery. The affected forearm, when healed, was held by the patient in a state of pronation.

CASE IV.—(*a*) Male infant, five weeks old; born in United States, Russian parents.

June 5th, 1891. Mother says the infant was born at the end of seventh month (?), and that delivery was attended with difficulties. She was quite ill after delivery, but made a good recovery. The umbilicus of the infant was much inflamed in the first week after delivery, and the mother noticed swelling of the left elbow; it was also painful; the swelling grew worse, followed by swelling of the hips. Within the past few days the left temporo-maxillary articulation became swollen. The infant cries when moved.

Status.—An atrophic, pale infant, weighing about three pounds; slight fever—101°; pulse too feeble and rapid at wrist to count accurately. Most marked swelling is that of the left elbow; the joint bones very movable, showing complete disorganization of joints. Skin over elbow thinned and livid, and in one place yellowish (pus). Large, fluctuating swelling over the left hip. Needle introduced withdraws pus and strikes bare bone. The right hip shows a fluctuating swelling, as also the left temporo-maxillary articulation. The umbilicus is not red or inflamed, but a drop of pus can be squeezed from it.

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The investigation of the above cases was confined to a bacteriological examination of the pus in the affected joints, the isolation of pure cultures, their injection into animals—rabbits, mice—and a study of the results thus obtained. The pus was withdrawn from the joints, after carefully cleansing the outer skin, by means of a large hypodermic needle, which was attached to a bulb of glass from which the air had been previously exhausted. All parts of this apparatus had been carefully sterilized—the needle and glass with dry heat, and the rubber tubing with steam. No possible contamination of pus withdrawn from the joints could occur in this apparatus. The pus was examined in its crude state on cover glasses, then sown upon obliquely solidified glycerin-agar, glucose-agar, or simple agar. Plates were also prepared of the above media, also peptone-gelatin, for the isolation of pure cultures. The pure cultures were again transferred to tubes of the various agars and gelatin and bouillon, and studied. All minutiæ of the Koch methods were closely adhered to and will not be further repeated here. The animal experiments at first consisted in a few subcutaneous bouillon injections into the rabbit. Subsequent to these, all injections were made directly into the circulation through the blood vessels in the ear of the animal. Mice were injected at the root of the tail. After death, cultures of the animal's blood were made, and studies of pus in the joints carried out on the same lines as had been done in the case of the pus obtained from the patient's joint. Tissues of the experimental animal were stained and studied by picro-carmine, gentian violet, ammonia-carmine. The bones were also examined, softened by picric acid. In the animal experiments a bouillon culture was used, and in conveying the disease from animal to animal the spleen pulp was rubbed up with sterile bouillon, and this solution injected into the circulation of the animal.

The micro-organism found in all of the above cases, without any variation, was the streptococcus. This streptococcus was invariably in a pure state in the pus with-

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drawn, sometimes from two or three joints of the same case. There was no contamination or presence of a second micro-organism, and in all the cases this streptococcus seemed to be the same micro-organism. It acted the same in both artificial culture and animal experiment. Three of the four cases were proved to act similarly in the animal experiments. In the fourth case the pus was simply artificially cultivated. The presence of a staphylococcus was looked for, but was absent in every case.

If the pus obtained from any and all of the joints was spread upon cover glass and stained with gentian violet, it was seen to contain cocci exclusively in chains of shorter or longer extent. The chains were slung in knots; they were partially deprived of stain by the Gram method. When compared with the chain cocci obtained by the same procedure from the pus of empyema, there was no gross difference of appearance. The empyemas were broncho-pneumonic and septic, as in cases published by the author. The simple stains, as above, of the pure culture showed very little or no gross variation from streptococci obtained from the sources above mentioned. The presence of more delicately formed chains of streptococci of smaller diameter in empyema pus did not give any support to the opinion that there was any specious difference between the two sets of micro-organisms. For in some of the pure cultures of streptococci obtained from the joints in the above cases, some chains of streptococci could be found in which the diameters of the individual cocci were smaller than others. The chains obtained from the joint pus in pure bouillon cultures were sometimes very extensive; the cocci composing them at times were seen flattened transversely against each other, or there was a bright line (reminding one of the divisions mentioned by Löffler) running the whole extent through the centre of the chain; there were also lines seeming to divide the cocci transversely. These appearances are seen in the larger cocci. In other chains these appearances were not found. I compared the above micro-organism

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with others obtained from another source, as the empyema streptococcus, and could establish the above appearances here also. The leucocytes in the specimens of crude pus, spread and stained upon cover glasses, seemed at times to enclose the streptococci in pairs, or small chains of two or four sets of pairs or more. This appearance in the crude pus of the joints was also found in the pus withdrawn from the chest in empyemas. The streptococci arranged in pairs are interesting, showing that the simple presence of cocci arranged thus in joint pus may be mistaken for micro-organisms which are met in diplococcus form. This has been referred to by many authors, and also by myself in a previous article upon "Joint Complications in Cases of Gonorrhœal Vulvo-vaginitis in Children." Culture methods will guard against errors. Though the simple clinical history of the above acute cases excluded the possibility of tuberculosis, still, for the sake of completeness, the crude pus was stained for the bacillus, with negative result.

If the pus was sown in peptone-gelatin in plates, there appeared, generally on the fourth day, small colonies which had a slight opalescent look against a black background. Microscopically, by transmitted light, these colonies had a very light straw color and finely granular appearance. They grew darker as they grew older. The gelatin was not fluidified, and the colonies were found deep, near the surface, or upon the surface. In agar, with or without glucose or glycerin, the colonies presented much the same appearances; they were microscopic at first, becoming larger in a few days; straw-colored at first, then darker. In platinum-needle cultures in gelatin, there appeared after four or five days a very delicate growth along the course of the puncture; this had a delicate white appearance against a dark ground. It was made up of fine, bead-like colonies. The growth rarely grew to any marked thickness and generally stopped at a certain point. There was not any tendency to spread at the surface, except immediately around the puncture opening.

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There was never fluidification. The transfer of colonies from gelatin or agar to bouillon, and maintaining the bouillon at a temperature of 37½° to 39°, caused the medium to become generally turbid over-night, then there was a deposit at the bottom of the tube of flocculi; the bouillon became gradually clear, and left along the sides of the test tube a finely granular appearance, which became more dense toward the bottom of the tube, where the deposit existed. The centre of the bouillon was finally clear. There was no variation in the above in any of the specimens obtained from the pus of any of the joints. The pus was really in its first state a pure culture of these streptococci. If a platinum loop of the pus was drawn over the surface of an obliquely solidified agar (glucose, or glycerin, or simple agar) over-night, there appeared in the thermostat a finely granular coating—moist, scarcely perceptible, in minute beads—on the surface. This became more pronounced after a few days, of a faint whitish hue against a black background. The growth advanced to a certain extent, then ceased to extend. The transfer to plates showed a simple uniform growth—that described above—the streptococcus. I made a few potato cultures; after seven days a small pellicle could be distinguished with the lens, of the color of the potato. It presented nothing characteristic. From the above it will be seen that this streptococcus did not present any characteristics which, upon artificial media, could be said to be peculiar to it alone, or distinguish it from streptococci obtained from other sources, as phlegmon or empyema. Tubes of sterilized milk stained with litmus were also inoculated with this streptococcus. The milk became coagulated; the coagulum was characterized by the presence of spaces in which bubbles of gas appeared; the litmus was changed to a pinkish or reddish hue.

ANIMAL EXPERIMENTS.—The animal experiments with the streptococcus which was found in all the cases reported in this paper were limited to the study of the effects upon white mice and rabbits. The effect of an

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injection of a pure culture in bouillon of the streptococcus into the subcutaneous tissue at the base of the tail of the white mouse, was that, after a few days, the animal invariably died. Death was preceded by symptoms of somnolence or dyspnœa; some of the animals presented a peculiar paresis in one or the other posterior extremity. The animals would drag the affected and relaxed extremity after them in running. This symptom appeared late. None of the joints in the paretic extremity were inflamed, so that I am not prepared to state the exact cause of this paresis. Autopsy upon the mice did not reveal anything but an enlarged spleen. Streptococci could be cultivated from the blood of the animal. It showed the same culture characteristics as the injected microbe. The organs (spleen and kidneys) showed, when hardened and stained, streptococci in masses, occluding the blood vessels in various parts of the organ, especially in the pyramids, similar to what was seen in the rabbit. Streptococci were also found in the tufts and blood vessels between the tubes of the cortex. There were no macroscopic pleurisies, peri- or endocarditis, or joint affections. The kidney epithelium was cloudy and swollen, as in the rabbit. The animals died of a species of septicæmia due to streptococci.

Rabbits.—If a few minims of a bouillon culture of the streptococci were injected into the skin of the ear of a rabbit, nothing followed except an inflammation of the skin of the ear. The ear was thickened and red, the redness spreading toward the base of the organ; the ear hung over the head of the animal. But the general condition of the animal continued good after the first few days. The inflammation subsided without abscess, and the animal survived. Subcutaneous injection under the skin of the abdomen or back gave negative results. Injections into the skin around the joints gave negative results. Injections of pure cultures into the circulation gave invariable results. The blood vessels along the borders of the ears were injected with a suspension of streptococci in bouillon, but

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after a few trials the spleen tissue of the animals dying of such injection was rubbed in sterile bouillon, and the juice injected into the circulation of a healthy rabbit. The result was striking, and may be summed up as follows: Such animals after twelve hours were quite ill, refused food, crouched in a corner, did not move about, and evinced dyspnœa in shallow and rapid breathing. The posterior extremities in some animals seemed to be quite stiff; in some they were not moved even when the animal was urged to do so. They were held stiffly in contact with the abdomen, either both or singly. The joints in some of the animals—those corresponding to the shoulder, knee, small joints of the toes (claws)—became red, swollen, painful. In other animals there was no swelling, but when the joints were handled or pressed they seemed painful. The local wound at the point of injection, for the first few days became red; there were swelling and increase of local temperature. These symptoms spread over the whole ear, but subsided after a few days, while the disease in the animal progressed; the animal died after a varying length of time, as described in the histories. The autopsies upon these animals showed that the spleen was enlarged in all cases. The blood from the heart and spleen showed streptococci, which were cultivated pure. The most interesting macroscopic appearances were found in connection with the joints. The shoulder joints, the knee joints of the posterior extremities, the small joints of the paws, were found in different cases swollen and filled with pus. This pus was creamy white, thick, and contained streptococci in pure culture. The heads of the bones making up such joints showed no gross change. The cartilages retained their original lustre, but in one case it seemed to have lost its normal gloss. There was no necrosis of bone nor subperiosteal swellings. The joints, which were not swollen but painful during life, showed when opened a thin, glairy, mucus-like substance, which adhered to the crucial ligaments in the knee. From this mucoid material (probably purulent) streptococci could

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be readily cultivated. The medulla of the bones corresponding to the inflamed joints was invaded with streptococci, which could be readily cultivated. The lungs, kidneys, spleen, and bones of the above animals were hardened and examined with reference to the presence of micro-organisms.

Lungs.—The lungs in some places were the seat of broncho-pneumonia in minute areas. The walls of the medium-sized bronchi were infiltrated with small and large round cells, and the adjacent alveoli were filled with small and large round cells. Especial interest attached to the bacterial invasion. This was seen in the capillaries in the walls of the alveoli; the streptococci, in small masses and chains, seemed to be in the walls or on the inner surface of the blood vessels. The vessels in the lungs were not plugged with streptococci, as seen elsewhere, but in the walls of the medium-sized bronchi large masses of streptococci existed, seemingly in the lymph spaces, also in the tissues of the lung. Minute chains of streptococci were seen between the endothelial cells of the alveoli, at times seeming as though in the cells themselves. It may have been that, being situated against the walls of the capillary blood vessel, or in a lymph space, they shone through the cell and appeared as though situated in the body of the same.

Kidneys.—The appearances in the kidneys resembled very closely those described by Babes in his work upon septicæmia in infants, and Baginsky in his report of autopsies upon cases of pyæmia in infants, similar to those of this paper. The blood vessels of the kidneys, especially in the pyramidal portion, were found filled and plugged with masses of streptococci for considerable distances. In some places the blood vessel presented simply a mass of micrococci, in other places separate chains were situated along the walls of the vessel. The vessels in the cortex which had been cut transversely were found plugged with streptococci. The capillaries of the Malpighian tufts were also the seat of bacterial invasion. In the kidneys

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of the animals which had died of a species of marasmus with gradual emaciation, the bacteria were found more or less scattered in twos and threes, and in small chains here and there in the vessels. There appeared in these cases to have been produced a condition in which the bacterial thrombi had gradually broken down and were washed away by the circulation. Those bacteria which were stained were all that had been left of an invasion *en masse.* These bacteria were with difficulty stained and easily decolorized. These things lead one to suppose that they might have been dead or inert. Streptococci could be seen in the uriniferous tubules in and between the cells. The epithelium of the tubules of the kidney was the seat of advanced degeneration. Whole tubules presented a cloudy appearance, the normal granulation of the kidney epithelium being absent. With picro-carmine stain the nucleus appeared as one red mass, broken up in some places into curious crescent forms or numerous irregular shapes. In other places the cell body, devoid of nuclear stain, filled up the lumen of the uriniferous tubules in one cloudy mass. Irregular stains of small red particles here and there indicated nuclear remains. In the Malpighian tufts the endothelium of Bowman's capsule seemed to be piled up in layers of two or three cells thickness, topped by granular detritus, which did not stain, and pressed upon the blood vessels. In short, the kidney presented extensive parenchymatous degeneration and bacterial invasion.

Spleen.—The changes found in the spleen of the animals dying of injections of the above streptococcus were very constant and characteristic. The spleen in all animals was enlarged sometimes to four times its original bulk. It was quite firm and hardened well. In animals which had died with gradual emaciation the spleen was almost normal in size and appearance. Thin sections of spleen were stained with gentian violet and picro-carmine. The invasion of streptococci was seen in the form of smaller or larger colonies scattered throughout the organ. Individual chains were seen among the cells of the pulp. The

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blood vessels in places were plugged with streptococci. The most interesting changes found are those which, excepting the bacteria, correspond closely to what has been figured by Oertel as occurring in diphtheria. Throughout the spleen innumerable areas were found in a state of necrobiosis. They were best studied with fuchsin stain or simple hæmatoxylin. These were found scattered through the pulp areas, in the vicinity or the centre of which generally was a mass of streptococci (colony). Instead of the normal pulp of the spleen, there was found nothing but a mass of particles of most diverse shape; the small and large round cells seemed to have disintegrated. Here are found most diverse pictures of spherical, semilunar, irregularly broken particles, which stain uniformly red with fuchsin. There is little or no granulation to the structure of these particles. Then there are also large cells in which the nucleus is broken up into numerous particles of various shapes or semilunar rings. These nuclear particles stain deeply, the cell body very little or not at all—its faint outlines alone can be seen. The streptococci are surrounded by granular detritus, the particles of which stain deeply and glisten when the focus of the immersion is brought upon them; between the necrobiotic cells we can see the spleen reticulum. On the outskirts of such an area a collection of irregular round cells, small and large, with irregular and deeply granular nuclei, can be seen. These areas are most numerous in the spleen, though they existed in the kidney also.

Bones.—The changes found in the bones of rabbits which had died of streptococcus injection, and had also shown joint complication, were interesting. The medulla of the bone was completely invaded with streptococci; they were found in the blood vessels, and in small colonies studding the medulla, in the whole extent of the shaft of the bone, where it was not possible to say whether they were in the blood vessels or not. Small and large chains were also found between the cells of the medulla. In the Haversian canals there were masses of

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chains and plugs of streptococci. In some of the bones at the junction of the epiphysis and diaphysis, the cartilage cells seemed to have become completely necrotic, the basement substance of the cartilage broken down; microscopic foci of tissue were found at such places which were necrotic. In the heads of the bones adjoining the affected joints the cartilage cells appeared many to one capsule, some broken down; but it is difficult here to say what is inflammatory and what infarct. The cartilage basement substance was remarkably free from streptococci. In the cartilage so-called capsule near the cavity of the medulla, the space around the cartilage cell showed what appeared to be small chains of streptococci. The cells of the medulla stained very badly, or not at all, with hæmatoxylin or picro-carmine. The whole tissue was uniformly hazy. Here and there were clusters of round cells stained with picro-carmine. The fat in places appeared in larger particles and greater clusters than we would expect to see in the normal tissue of the medulla. Nothing resembling a distinct sequestrum of bone was discovered in any specimen, though, as can readily be seen, the whole bone was the seat of active inflammatory changes. A piece of the trochanter major removed from Case I. at operation was found invaded with streptococci. The basement substance of the cartilage of the trochanter was fibrillated, had lost its homogeneous appearance, and minute areas made up of detritus and streptococci were seen. These areas adjoined the junction of the trochanter and the bone.

The radius, minus its epiphyses, which was removed entire from Case III. at operation, was not destroyed for examination. Inspection of the bone at the upper end shows a worm-eaten appearance just below the neck of the bone; this is most apparent on the posterior aspect of the bone, and reaches as far as the mid-region; the medullary canal is exposed in places. The lower end adjoining the wrist is simply rough, but well preserved. There is no periosteum. There can be no question as to

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the process in question being osteomyelitis, and the specimen was preserved in its entirety for exhibition. Nothing further could be gleaned by microscopic examination.

ANIMALS EXPERIMENTED UPON. *Rabbit* 1.—Injected in the skin of the ear with a pure culture in bouillon of streptococci obtained from Case II. In three days there were redness and swelling of the ear, spreading toward the root of the organ, with increased temperature. This redness subsided after a few days, and the animal showed no other symptoms. The same animal was injected in the skin of the paws about the joints, and there was only a circumscribed local reaction.

Rabbit 2.—White, medium-sized animal; injected in the blood vessels of the ear with a bouillon culture of streptococcus; this culture was only twenty-four hours old, and was transferred from agar. Animal died in twenty-four hours. Culture made from blood of heart and spleen pulp. The spleen pulp, rubbed up in bouillon (sterile), injected into animal 4.

Autopsy showed very large spleen; streptococci in blood, nothing in joints, but a distinct redness of the head of the right femur, the acetabulum, and ligamentum teres.

Rabbit 3.—Injected with a bouillon culture of streptococci obtained from Case I. The culture injected just as it was turning turbid (six hours old). Twenty-four hours after, the rabbit seemed quite ill. The ear at puncture was red and swollen; after forty-eight hours he crouched in a corner and seemed unable to move. When laid on his back, will remain this way with hind paws drawn up toward the abdomen. When he hops he does so very awkwardly, the whole body being raised after him; hind paws are moved very little. Ear at puncture red and swollen. This condition persisted for twenty-four hours. After four days the left hind leg is drawn up toward the abdomen; animal is very ill; he does not move about, and the swelling of the ear has spread toward the base; died on the morning of the sixth day.

Autopsy: Rigor mortis; heart and lungs show nothing abnormal, but there is a fibrinous peritonitis, with adhesions between the coils of intestine. There was no great amount of pus in any joint, but the cartilages of the heads of the bones in the knee joint were covered with a thin membranous deposit like fibrin or muco-pus. The same

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was seen in the hip joint. This fibrinous, glairy substance, taken from between the crucial ligaments, was found to contain streptococci. The medulla of the long bones contained streptococci, as did also the blood and spleen juice and peritoneal exudate.

Rabbit 4.—White and gray, medium-sized animal; injected with spleen juice in bouillon of rabbit 2. The injection was made directly into the blood vessels of the ear. On the third day the animal appeared very ill and lay crouched in a corner. The left hind extremity is drawn up toward the abdomen; the animal does not move; is very irritable. Ear inflamed and swollen at the root. This animal died on the fourth day after injection.

Autopsy: Suppuration of the right knee; pus thick and creamy. Left knee full of purulent effusion, more serous than the right knee. Pus in the right shoulder joint. Pus in the right hip joint. Spleen very large. Blood of heart, spleen pulp, pus of the joints, and the medulla of the bones inoculated into agar tubes; streptococcus obtained. Pulp of spleen reinjected into large buck rabbit.

Rabbit 5.—Small, black animal, injected subcutaneously with a bouillon culture of streptococcus obtained from the pus of joint of Case I. This animal at no time subsequent to this injection showed any ill effects of the same; did not die of the injection; was killed after a few weeks; nothing found.

Rabbit 6.—Gray, active, medium-sized animal; injected in the vessels of ear with *pus* obtained from Case II. After two days the rabbit was not very well. The injected ear red and swollen, especially at the base. This animal became very ill, and on the twelfth day the ear was much swollen and painful; the animal did not eat or move much, and crouched stiffly in a corner; breathed in a shallow but rapid way. This animal, however, recovered from the immediate effects of his injection, was able to hop about, but emaciated gradually, and died with symptoms of toxæmia.

Rabbit 7.—Lively, large buck rabbit; injected with spleen juice in vessels of the ear; spleen taken from rabbit 4, Case II. Became very ill and died the fourth day after injection. The animal had shown marked local reaction around the puncture in the ear; he had crouched in one corner; refused food. When turned over was quite stiff; did not at first extend paws. After a few attempts, put himself right again. Breathing shallow and labored.

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Autopsy: Heart and lungs negative; spleen enormous in size. The knee and shoulder joints are the seats of suppuration. Pus covers the crucial ligaments and heads of the bones. The right shoulder is distended with pus. The left shoulder contains a small amount of purulent serum. Culture in agar made from the blood, spleen juice; and pus in joints, and after twenty-four hours in thermostat the usual delicate streptococcus growth obtained.

Rabbit 8.—Medium-sized animal; injected in the ear with a pure culture in bouillon obtained from autopsy pus of rabbit 7; died upon third day after injection. Left knee contains small amount of pus; no pus in the other joints, no fluid in joints. Spleen enormous in size; no difficulty in obtaining pure cultures of streptococci from the pus in joint, also from the blood and spleen juice.

Rabbit 9.—Injected in blood vessels of the ear with a pure culture in bouillon of streptococci obtained from rabbit 3, Case I.; death after four days. The ear of the animal was much swollen; the spleen was very large; no pus in the joints. The blood of the heart, spleen, and medulla of the bones showed abundance of streptococci.

Rabbits 10, 11, and 12 received injections into the circulation of pure culture of streptococci in bouillon obtained from pus of the hip joint in Case I.

Rabbit 10.—Medium-sized, white animal; injected in the vessels of the ear; died after four days with usual symptoms.

Autopsy showed sero-fibrinous peritonitis, large spleen. There was no pus in the joints, but an excessive amount of serum in right knee joint. Spleen was very large. Streptococci in blood, spleen, and medulla of bones, and above serum of the joint.

Rabbit 11.—Medium-sized, white animal; injected at the same time as rabbit 10, with same culture; died on the eighth day.

Autopsy: Injected ear livid and swollen. The animal's hind paws are both œdematous and swollen; several small joints in the paws much swollen, distended. In all, five toes of the ten were affected. The subcutaneous tissue very œdematous. The affected joints are filled with a thick, creamy pus; a few inguinal glands swollen; knee, hip, and shoulder joints showed no pus, though containing a little more than the normal amount of serum. Spleen very much enlarged. Pus from the above joints

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contained streptococci, as did also blood of the heart and spleen.

Rabbit 12.—This animal, of medium size, was injected with spleen pulp of animal 10 rubbed up in bouillon. The animal was quite ill for a time. The ear showed marked reaction. There was the same stiffness of the posterior extremities. The left hind leg seemed worse than the rest, and was not moved. These symptoms subsided; the animal became much emaciated; and though the ear swelling had disappeared and the animal hopped about, the emaciation progressed. The animal died after three and a half weeks.

Autopsy revealed signs of old peritonitis, a few adhesions being found. Both knees and both shoulders showed an excess of synovia. Spleen was normal in size. Nothing could be cultivated from blood, spleen, or joint synovia.

Mice.—A number of white mice, twelve in all, were injected as follows: (*a*) With pure bouillon cultures of streptococci obtained from pus of Cases I. and II. (*b*) With crude pus from Cases I. and II. (*c*) With spleen pulp, rubbed up in sterile bouillon, of animals dying from procedures *a* and *b*. In all cases the result was invariable: only one animal of the twelve survived. The mice after two or three days showed a peculiar paresis, in some cases in the hind legs. I am not prepared to state the cause of this symptom. The injections were all made in the usual vicinity, at the root of the tail.

Autopsies revealed a large spleen, and streptococci in the blood and various organs. I will not detail individual experiments, as they were all similar and the result the same as already stated.

When the above work was in progress I was not aware of the work accomplished in this same direction by the French school. The invariable occurrence of a streptococcus in pure culture in all four cases, and in these cases the subsequent appearance of bone necrosis, led to the inevitable supposition that we had to deal with an acute infectious osteomyelitis, secondary to the invasion of the bone by a streptococcus, which, as far as investigations show, is identical in biological behavior with the Streptococcus pyogenes. We had decided, before the work

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of Lannelongue and Achard had agreeably confirmed our theories, that we had to deal with a variety of acute infectious osteomyelitis to which the infant organism was peculiarly susceptible, and which in its own sphere played a rôle exactly the counterpart of that played by the staphylococcus later in life. In reviewing the above work, we find two cases of joint suppuration and bone involvement after probable umbilical infection, one following a severe scarlet fever and one in which a successful result was attained; the osteomyelitis appeared during the full progress of a broncho-pneumonia with chest effusion. A portion of this effusion was withdrawn from the chest at the time; no micro-organisms were found in the serum withdrawn, and its injection into mice was followed by negative results. This may have been due to the absence or scarcity of micro-organisms in the portion withdrawn. Another specimen would have enlightened as to the nature of the effusion, but it was decided not to disturb the patient a second time. All the cases belong to the so-called septico-pyæmic class, and the most probable supposition in Case III. is that here the infection of the joints may have complicated a scarlet fever or a measles, in which the rash may not have been observed by the mother, or that we have to deal with a case following a pneumonia—a most likely complication. The animal experiments, performed as they were with a streptococcus common to, and found alone in all of, the cases, give us some interesting data. Not that we must insist that the animal and the human disease are the same or peculiar to this streptococcus. Lannelongue and Acharp have isolated streptococci from diverse sources and obtained similar and more pronounced results. Löffler also injected streptococci of Fehleisen in a manner similar to that which he had pursued with his diphtheria streptococcus, and had produced similar joint suppurations. The streptococcus, and particularly the one isolated by others and myself in the above cases, is capable of producing in rabbits an acute infectious disease, and in some

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animals, not all, joint complications. French authors think that the amount of streptococci injected will tend toward yielding certain results, as necrosis of bone, if large quantities be injected. However this may be, there is no difficulty in establishing, in this acute infectious disease of rabbits as a result of streptococcus invasion, a distinct and characteristic response on the part of the bone tissue and joints. The regularity of this occurrence in these experiments leads me to suppose that the presence of streptococci in the structures of a bone are a menace to the integrity of the neighboring joints, and that, given streptococci in the bone marrow, an arthritis is almost certain to follow. We cannot explain the real nature of these cases by saying they are those of pyæmia. We must class the joints in the above experiments in the same category with the pleura, where we suppose an acute pneumonic empyema to result from a contiguous focus of involved lung tissue. No one will look upon the filtration of streptococci from the marrow tissue through the head of the bone by means of lymph channels as an improbable theory. Once in the joint, the streptococcus creates a variety of accidents. The invasion of the whole organism *en masse* with streptococci is not necessary to the involvement of bones. A very small amount of infectious material may be arrested in any one bone, and, having been freed into the circulation from a streptococcus focus and lodging in a single bone, stop there. Such a bone might be involved to the exclusion of the rest of the osseous skeleton, as in Case III. Again, assuming that there was a continuous reception of minute and constant quantities of micro-organisms into the circulation, there might be produced an immunity of the organism against their action, except that in certain structures this immunity does not exist to a degree sufficient to prevent suppuration; the result is a monarticular suppuration, which, though it inconveniences the patient, leads to no necrosis, no destruction of the head of the bone. The adjacent bone may be the seat of active

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mycotic invasion, as in the animal experiments. These cases, I think, are osteomyelitic; their difference in severity from other cases may be accounted for by the presence of certain economic conditions which prevent multiple joint affections and general streptococcus destructive invasion. These monarticular joint suppurations are not simply catarrhal, nor do we explain by saying they are pyæmic. They are osteomyelitic, just as much as those joint suppurations in which wide destruction of bone tissue results. The monarticular joint suppurations, or those cases where the joints at both bone extremities are involved, as in our case, must be classed with those severe and fatal cases in which many joints are involved and the patients die both of exhaustion and toxæmia. They are all cases of osteomyelitis secondary to streptococcus invasion of the bone tissue. Such a streptococcus may have been present in the primary disease (scarlet fever, measles, diphtheria, etc.) as an accident —a so-called mixed infection. Once its invasion into the economy is inaugurated, we receive clinically pictures of greater or lesser severity, depending on laws to which the economy must conform in the presence of any infectious disease.

The favorable prognosis of the monarticular cases rather influenced most authors in discarding the possibility of an osteomyelitis as a causative factor. An osteomyelitis may, as any other infectious disease, be of various grades of severity. The German and French schools have shown that any portion of a bone, the epiphysis or the diaphysis, or both, may be the seat of disease. Any mycotic invasion of a bone or part of its structure is an osteomyelitis. It is not necessary in all cases of osteomyelitis to obtain foci of necrosis of bone. We can, as in the animal experiments, conceive of a stage of the disease in which, though an invasion of the bone marrow and bone tissue with streptococci is general and in active progress, necrosis is far from being one of the leading factors in the existing inflammation. These conditions must be

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explained in a great measure by the theories of the acquired and natural immunity of the human economy against disease. Some patients present to the invading organisms—whether in the vital fluids produced in the tissues or adherent in them (Virchow), or the serum of a circulating fluid, the blood (Buchner), or peculiar properties of the white blood cells (Metschnikoff)—peculiar phases, differing in every individual. In this way a micro-organism in one person may produce certain effects; in others it may stop short far from such effects. The virulence or the lack of this property in a streptococcus will not explain everything in connection with monarticular or multiarticular joint suppurations. Every microbe, virulent to a greater or less degree, must also meet in the economy complicated conditions favorable to its growth or tending to its limitation and destruction. Theories like the above must always have the fate of refutation and opposition; yet it seems the most plausible to offer, as being in accord with advanced knowledge and experiment. The acute suppurative arthritis of infants and children included in this paper is due to an acute infectious osteomyelitis. This osteomyelitis may be secondary to the infectious diseases (puerperal fever, scarlet fever and exanthemata, diphtheria, pneumonia), and is due to a streptococcus for the present closely resembling the Streptococcus pyogenes (or that isolated by Löffler in diphtheria). This osteomyelitis need not be accompanied by bone necrosis in the very mild cases, and may be linked with, or manifested by, acute suppuration in one joint only. The bone and joint may in these cases be completely restored to the normal state. Two joints at both bone extremities may be involved, with destruction of the intervening bone. Wide streptococcus invasion, gradual or rapid, may meet conditions in the organism favorable to the causation of destructive osteomyelitis in several bones, multiple suppurative arthritis, and gradual death of the patient with symptoms of exhaustion and toxæmia.

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NOTE.—The experimental work was performed in the Carnegie Laboratory, New York.

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II. THE SURGICAL TREATMENT.

BY W. W. VAN ARSDALE, M.D.

THE class of cases to which reference has been made in the first part of this paper is clinically so discouraging to the surgeon to whose lot their treatment falls, that it is not surprising to find many surgeons of the opinion that operative interference of any kind is hopeless from the first.

We have all of us seen these cases brought into the clinics with the marked pallor, the great prostration, the low fever indicative of septic intoxication, and the multiple joint abscesses, which stamp them from the first as beyond

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the reach of successful surgical treatment. And if we have been led by a sense of duty to fulfil the most obvious indications as to surgical interference, and have given exit to the pus in the affected joints, we have done so with a sense of the uselessness of the procedure, and in the face of a bad prognosis given to the parents of the child.

In the cases narrated in the first part of this paper it was my fortune to see the little patients in consultation from the first, and the treatment of the earlier cases was conducted upon general surgical principles, rather than founded upon any certain line of ideas based upon an intimate knowledge of the pathology of the conditions underlying the disease. And had it not been that one of these cases was saved, as I believe, by an interference of a somewhat desperate nature, suggested by the laboratory experiments with the cultures from the former cases, and done with the aim to strike at the root of the evil, I should not have felt justified in presenting this subject.

It is understood, from the facts brought out by my colleague in the first part of this paper, that the cause of the disorder in all of these cases was the pyogenic streptococcus, which, from localizations in the bone marrow of the larger bones, produced the joint suppurations as secondary affections; so that we are enabled, in view of the pathological facts found, to specify the cases as cases of streptococcus osteomyelitis affecting the joints, instead of speaking of them simply as pyæmic.

This disease, streptococcus osteomyelitis, being as yet little studied, and, in fact, only mentioned in a very limited number of the most recent monographs—where, however, no reference is made to the treatment—I propose to invite your attention to some therapeutical considerations of the affection under discussion, made in accordance with our advanced knowledge of the pathology and etiology of this disease.

Before analyzing our cases with a view to improving the treatment of their entire class, it appears proper to differentiate the cases, on the one hand, from those cases

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of mild monarticular purulent or sero-purulent affections in relatively healthy children without apparent cause, together with the polyarticular suppurations after infectious and exanthematous diseases (such as diphtheria, scarlet fever, and the like); and, on the other hand, from the cases of osteomyelitis, with or without accompanying joint affections, occurring in adults, which are so familiar to us in our clinics, and which are attributed to staphylococcus invasions.

There can be but little doubt that the last-named class of cases, as they appear in the literature and are observed in our hospitals and clinics, appear much less grave than the class of cases under discussion. This statement is borne out by the fact that a large number of authors (Demme, Chassaignac, Fischer, König) are in favor of an expectant treatment of acute infectious osteomyelitis in the adult until the time when the necrosed bone shall have become loosened by eliminating suppuration. Again, many writers (Rosenbach, Baumgarten), familiar with the different behavior in laboratory experiments of the two varieties of pyogenic germs mentioned, state that the clinical course of the diseases induced by the streptococcus is of a more grave character than those induced by the staphylococcus. These considerations, added to the clinical observation of our cases, give me an additional reason for urging a more radical and timely interference in all cases similar to ours.

As regards those cases of acute suppuration in one joint, occurring in children, which have been described by Volkmann under the name of acute catarrh and blennorrhœa of the joint, there can be no doubt, in the face of our present knowledge of the etiology of the affection, that we have to deal with the identical disease under discussion, but with this difference—that the infection is much milder in form. In consequence of this, the clinical aspect of these two classes of cases is entirely different, and especially so should be the treatment.

In Volkmann's catarrhal inflammation of the joint the

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child is in apparently good health throughout, and, when brought to the surgeon, does not appear to suffer from aught but a local trouble. The entire course of the disease is a more acute one; it is less insidious in its attack, and yields promptly to surgical interference of the simplest nature—simple incision into the joint and drainage, with the use of suitable splints and antiseptic dressings (even without irrigation), being sufficient to restore good function of the joint. The only measure imperatively called for is the avoidance of delay, it being of great importance to make an early incision before the epiphyseal cartilages have been eroded and destroyed—although Rauchfuss has shown that in infants even these destructions are quickly repaired by the more active growth of these parts in children.

Much the same conditions are present in the suppurative joint affections after infectious diseases. In connection with this point I offer the following case:

B. L., five years of age, a native of the United States, had had measles some weeks previously; was brought to me with pain and swelling at the knee joint. No precise history of the attack. For two days expectant treatment was adopted, a splint being applied. Then the skin over the joint having become red and inflamed, and the swelling not having diminished, aspiration of the joint was done, which revealed thick, creamy pus. An incision was immediately made over the point of greatest prominence, corresponding to the outer condyle of the tibia, a drainage tube inserted, antiseptic dressings (creolin) and a splint applied. Under three changes of dressing the joint recovered perfect function. But at the site of incision the skin remained adherent to the bone. (October 7th, 1891.)

If we compare the case just narrated, as a representative case of the class formerly called catarrh of the joint, with the cases reported to-night, we observe that, clinically, there is little danger of confounding them. The general symptoms of fluid in the joint, it is true, are equally prominent in both classes of cases. But in the acute mon-

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articular arthritis of children there is generally a history of a sudden commencement with a high fever and a chill, after which the only affection found is the swollen joint. In the cases under consideration, on the contrary, the fever has already been established, and the joint swelling has gradually appeared, often without even attracting the attention of the mother, without so well-marked pain, and without the sudden exacerbation of the fever.

The *monarticular* nature of the affection described by Volkmann as catarrh of the joint in children can hardly be brought forward as diagnostically important, since, in the class of cases under consideration, we may find only one joint affected at first. On the other hand, in the acute joint affections following the exanthemata and infectious diseases we frequently find two or more joints simultaneously affected.

Indeed, it appears from a study of the literature that we may have intermediate forms representing transitions between the two. But since these cases are generally not accompanied by pathological investigations of any kind, we have no other proof of the truth of this assertion than its probability.

The similarity of the etiology, both in the typical cases of the disorders referred to by Volkmann (Krause), and those following acute infectious diseases such as diphtheria, scarlatina, measles (Löffler, Heubner, and Bahrdt), and those under discussion, has been established in the first part of this paper, and enables us to consider them as identical in nature. In order the more to distinguish between them, however, I shall, in this paper, speak of the so-called acute catarrh of the joint as the *mild* form, and of the other class as the *grave* form of streptococcus osteomyelitis (affecting the joints) in children.

We now turn to the consideration of the graver forms of osteomyelitis in children, due to streptococcus invasion.

Contrary to the generally accepted statements concerning osteomyelitis due to staphylococci, that it only attacks children in robust health, and then very acutely,

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the disease under consideration appears to affect only such children as have been recently exposed to some weakening influences, such as acute infectious diseases, or wounds and ulcerations of long standing.

The commencement of the disease is insidious, and the first thing noticed by the mother is the gradual development of symptoms of prostration and failing vitality. The child, if brought to the physician at this time, at once awakens solicitude. It lies quietly, pale, with sunken eyes surrounded by dark rims; its tongue coated, fuliginous; its skin dry; its temperature not very high, however. Occasionally its face is contorted, it utters sharp little cries, and when disturbed or touched moves its limbs spasmodically, as if in great pain. Examination of the joints at this stage fails to reveal any local change, but whenever certain parts are touched, corresponding to one or more bones with their neighboring joints, exaggerated expressions of suffering may be observed.

In the more advanced cases swellings of the joints are more pronounced, and have been seen by the mother. They have developed gradually, and not until the child has been ill for some time. Diagnostic aspiration reveals thick pus or sero-purulent fluid.

In the course of the disease further joints generally become the seat of the same affection, and complications may appear at any time in the internal organs and the various synovial sacs.

According to the vitality of the child, it succumbs sooner or later to the disease, the symptoms of prostration increasing, with failing pulse, inanition, and coma.

The diagnosis depends mainly upon the early establishment of joint suppuration, with the great prostration and "typhoid" condition.

Differentially we must bear in mind acute articular rheumatism, primary suppurative arthritis, acute tuberculous osteomyelitis (as described by Kiener and Poulet), and syphilitic joint affections.

The former are not characterized by such marked

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prostrations, while the fever is generally much higher; but the syphilitic joint affections may easily simulate the disease under discussion, and in this connection I may refer to a case which I had the opportunity of observing in consultation with Dr. Koplik.

Male child, eight weeks old, was brought to the dispensary with painful swelling of the right elbow joint, September 9th, 1891. His mother had had syphilis, and had been under treatment for endometritis decidua. For the past week she had noticed the gradual development of the swelling at the elbow.

Status.—The child appeared well developed; no fever. Sparsely distributed papulo-squamous syphilide present on arms, hands, palms, nates, thighs, legs, and soles of feet. Discoloration and sallow tint above eyebrows and alæ of nose. The elbow joint was much swollen, painful, but the skin above it not reddened. There was no distinct fluctuation; the epiphyses of the bones forming the joint were enlarged. Attempted passive movements called forth manifestations of pain. No preternatural mobility.

Diagnosis.—Congenital syphilis.

The treatment consisted in the administration of calomel (gr. ¼ t. i. d.) and iron (Wiederhofer's powders). The elbow was put on a suitable splint for two weeks. After three weeks the constitutional symptoms had disappeared and the elbow joint appeared in every way normal.

Actinomycosis and glanders may also simulate the disease under discussion. But, on account of the rarity of their occurrence in children, I omit a comparison with them.

The treatment of the cases described in the first part of this paper was conducted, as mentioned above, on general surgical principles, at least at first.

As soon as a joint appeared swollen and painful it was aspirated under strict aseptic precautions, and the fluid extracted examined. If it proved to be purulent, the joint was incised under antiseptic precautions, provided with drainage, antiseptically dressed and immobilized by the use of splints, and kept elevated (this treatment

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being the same as that found effective in the milder forms of osteomyelitis mentioned above). The case was then observed. If, in the further course of the disease, the drainage proved inadequate, or if the disorganization of the cartilages of the joint appeared progressive, further and more effective measures were adopted, consisting either in laying open the joint by wide incisions and counter-incisions (arthrotomy), with subsequent packing and immobilization, or else in arthrectomy or exsection of the joint.

Thus in Case I., of the female child two weeks old, incision of the right knee was done (on the inner aspect) immediately after the aspirating needle had revealed pus. The pus being of great consistence, the joint was also well washed out with a one-per-cent creolin solution, and a drainage tube left in. This was followed by apparent improvement. Nineteen days later the left knee was aspirated, but, no pus being found, no operation was done. The hip joint now being swollen and reddened, it was incised at the point of greatest prominence, internally to the femoral artery, and supplied with a drainage tube. On the twenty-fifth day of observation the abscess from the costosternal joint was opened and drained. On the fifty-third day of observation, the joint cavities still secreting pus and the disorganization of the cartilages progressing, the right knee was treated by arthrotomy and the left hip by exsection of the head of the femur, the left knee being partially excised. Creolin was used throughout for irrigation and dressing. The knees were packed with creolin gauze through the lateral incisions, and the cavity of the hip joint supplied with a large drainage tube. Extension splints were applied. The child was cared for at the New York Polyclinic Hospital. Death did not occur until two days after the operation. The delay in the final operative procedures was caused by a desire to employ conservative surgical measures.

In the second case, a girl of two years, the left wrist joint was aspirated on the first day of observation, and all the swollen joints of the hand were promptly opened and drained. Six days later both elbow joints appeared swollen. The right elbow joint was incised and drained, but operation on the left one was deferred on account of

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the prostrated condition of the patient. This joint was opened seven days later and the patient died one day afterward. The delay in this case was caused by the apprehension that the patient, in her weak condition, could not stand further surgical interference, broncho-pneumonia and a complicating nephritis being present.

At the time when these two cases were first under treatment they were entered upon my books as "septic arthritis" and spoken of as cases of "pyæmic joint affections." This diagnosis will show that at that time our attention was directed almost entirely to the joints themselves as the main seat of the affection and as the proper object of therapeutic attack.

It is true I was aware at that time of the theories (referred to at some length by Müller) that the infectious agents entered into the joints from the medulla of the bones (Driessen) and the epiphyseal portions (König), but I did not at that time imagine the foci in the bone to play so important a part in the disease as I was afterward led to conclude. And, in fact, there was absolutely no symptom present in our cases which could in any way lead the observer to suspect the diaphysis as the main seat of the disease.

But when, shortly afterward, I had the pleasure of witnessing the experiments on animals performed by Dr. Koplik, and examining the cultures and specimens emanating from these cases, my attention was more especially directed to the conditions present, in these cases, in the medulla of the bones. Here we find numerous and large foci, representing pure cultures of the micro-organism proved by experiment to be an etiological factor of the disease, located in the medulla proper and in the Haversian canals. As long as these foci are permitted to remain and to thrive and flourish, it is natural to suppose that the economy will be inundated by large amounts of ptomaines and toxines, and that to this fact is due the great weakness and prostration which presents so important a clinical feature in these cases.

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What, then, appears simpler and promises a better hope of success in combating the disease than the removal of these foci as early and as thoroughly as possible? For in this manner we attack not only the cause of local trouble, but the breeding place of systemic intoxication as well.

In looking back at the first two cases it is evident that the treatment of the first could be materially improved, provided nothing interfered with the carrying out of our intentions. Much might have been gained by cutting down on the bone of the femur and examining into its condition, with the view of determining whether the periosteum appeared loosened about the bone, and whether other symptoms of acute osteitis and suppuration of bone existed. Whenever two neighboring joints of the same limb are simultaneously affected it is highly probable that the entire diaphysis is affected with an acute diffuse osteomyelitis. Could not, then, the entire diaphysis be removed, and at the same time both joints be evacuated, in order both to prevent the further necrosis of bone and also prevent the poisoning by absorption, and the life of the patient thus be saved?

Radical measures in the acute stage have frequently been proposed for necrosis of bone following osteomyelitis, especially in adults. All surgeons are familiar with the tenets of Chassaignac and others, who advised primary amputation in such cases where the whole of the femur was attacked by acute osteomyelitis. But amputation, or exarticulation, at the hip is such a dangerous procedure in these conditions of pyogenic intoxication that, in consequence of bad results, the practice has been abandoned. Indeed, even the size of the wound alone in such a case appears too serious a complication to be sought when it can possibly be avoided.

Again, Holmes, Ollier, and others have spoken in favor of early subperiosteal resection of the diaphysis or parts of the bone in acute osteomyelitis and periosteitis. But, as far as my knowledge extends, such procedures have never been advised in the treatment of what has hitherto

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been called septic multiple arthritis, or pyæmia principally affecting the joints. And yet, from the evidence brought forward in the first part of this paper, such a course of proceeding does not seem inappropriate.

It was not until after such considerations had been called forth in our minds by the clinical course of the first two cases that the third case presented itself.

This, it will be remembered, was a girl ten months old, who, when first seen, presented pneumonia involving the right, middle, and lower lobes. There was at this time a fluctuating swelling of the wrist, extending somewhat up the forearm; the elbow joint was also swollen, but not fluctuating. The wrist joint, revealing pus on aspiration, was incised and drained, and antiseptic dressings and suitable splints were applied. Two days later the disorganization of the lower epiphyses of the bones of the forearm appeared to have increased in extent, and, therefore, an indication for further interference was considered to be given; yet, the temperature and pulse rate being high (104° and 160, respectively), and much dyspnœa being present owing to the pneumonia, such operative interference was postponed for fourteen days, when the patient had recovered from the effects of the lung complication. Then, there being more evidence of pus in the elbow joints, both were opened with extensive incisions; necrosis was found at the epiphyses. Next, the radius was laid bare by a longitudinal incision—at first in its lower half—and it proved to be, as suspected, necrotic in its entire extent. It was, therefore, removed *in toto.* The wound was packed with creolin gauze and extension splints applied. The periosteal covering could not be recognized, with the exception of some shreds in the neighborhood of the elbow joint, and its disappearance was attributed to the delay in the operation and the extension of the inflammatory process.

The condition of the patient being one of extreme prostration and weakness after the pneumonia, a bad prognosis was made at the time of the operation, which was done at my clinic at the New York Polyclinic. Nevertheless the little patient made a rapid and good recovery.

At the time of dismissal from observation, some two or three weeks later, there was no evidence of a regenera-

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tion of the radius, and the firmness of the hand had been materially impaired by the loss of the radius, with the usual bowing of the forearm consequent upon radial shortening. I felt, however, that this was better than the loss of the entire forearm by amputation; nor could I escape the impression that the chances of recovery on the part of the patient had been materially improved by the substitution of the extirpation of the radius for the more formidable operation of amputation. Unfortunately all trace of this little patient has been lost, as the address was mislaid, and the provision of a suitable apparatus for supporting the hand was, therefore, impossible.

I feel confident that, by paying greater attention to the diaphyses of the bones in cases of multiple septic arthritis of infants, we can do more to avert the fatal termination, and that a timely subperiosteal removal of the diaphysis, when two large joints of the same limb are affected, even if the limb should remain crippled, will be found more beneficial to the patient than other modes of treatment.

Especial stress, I contend, should be laid on the *early* interference. It is apparent, from the laboratory experiments on animals referred to, that, in the cases of the rabbits experimented upon, the joint suppuration was present at a time when only osteomyelitis in the medulla of the bone was found, but when no foci could be found in the epiphysis or head of the bone. It therefore appears probable that the arrosion of the cartilages represents a more advanced stage of the osteomyelitic inflammation, and that there is a time when, although both the diaphysis and the joint are affected, yet the epiphyseal cartilages still remain intact. If it were possible to take out the diaphysis at this time it would probably be possible to secure excellent results; complete regeneration of the diaphysis from the intact periosteum and complete restoration of the function of the joints, owing to the unimpaired condition of the epiphyseal cartilages, being the ultimate issue which we may properly expect.

Unfortunately in practice the difficulties of diagnosis

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and the hesitancy on the part of the parents of the children will frequently interfere with an ideal conduct of the therapy in these cases. We should, however, not be deterred from making an exploratory incision down to the bones suspected of being the seat of the affection, and examining thoroughly into the condition of the bone and its covering.

I am well aware, too, that in a certain number of cases where diaphyses were removed *in toto* in the acute stages of osteomyelitis in adults, there was little or no consecutive formation of new bone by the remaining periosteum. There are a number of such cases reported in our literature (Vogt).

It is therefore not impossible that this danger might threaten our little patients. As far as I know, however, no such case has been reported in children. But even in case the reproduction of bone should not take place as expected, I believe even this result would be more desirable than the danger to the child of exposure to the toxic influences emanating from osteomyelitic foci permitted to remain in the system. And in case a femur should have been removed in conformity with the treatment advocated above, and consequent reproduction of bone fail, a secondary amputation of the thigh, when the child has recovered its health, would certainly be a less dangerous operation than when done in its septic condition.

A further point of interest which requires our attention attaches to the condition of the epiphyseal cartilages.

Whenever primary subperiosteal extirpation of a bone in the acute stage of osteomyelitis in adults has been advised and practised (Holmes, Giraldès, Duplay, Thelen), it was considered a *sine qua non* that the epiphyses should be intact. If done, however, as in our third case, for an indication derived from the joint affections, it may happen that the epiphyseal cartilages are found extensively arroded or entirely destroyed, especially if the surgical interference has had to be delayed. In these cases the vital indication will still reign supreme, and we should not be

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deterred from endeavoring to save the life of the patient by the fear of crippling one limb.

Instead, however, of removing the entire osseous and cartilaginous structures at once and together with the necrosed diaphysis, I would propose rather to remove the arroded cartilages, or as much of them as is deemed necessary, by resection from the joint cavity, at the time of exploring and draining the joint. In this manner it may be possible to preserve a thin section of cartilage at the epiphyseal line, which, left in connection with the periosteal covering of the diaphysis, may insure more favorable conditions for the ultimate restitution of function.

The invasion of the central canal of the larger bones for the purpose of scraping out the medulla with sharp spoons and curettes (Sédillot, Keetly, *et al.*) is not easy of accomplishment in children, where the bones are small; nor could we expect it to hold out much promise of success when we bear in mind that the Haversian canals, which cannot be reached by this process, were found crowded with streptococci in the experiments, from which localization absorption of poisons into the system could still go on uninterruptedly.

The same consideration applies to the practice of trephining the bone (Ollier).

The presence of foci in the kidneys and other internal organs of the body may certainly present contra-indications to surgical interference of a severe character. When, from examination of the urine, we find nephritis present, or complications existing in the lungs, pleuræ, or pericardium, we may with propriety hesitate, in view of the more unfavorable prognosis, to resort to extreme measures in attacking the disease.

Thus, we read of cases of joint suppuration reported in our literature (*e.g.*, Baginsky) where the infants were in so hopeless a condition, owing to complications in internal organs, that all interference could not but be regarded as utterly useless.

Nevertheless, the removal of every focus from which

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inundation of the system with ptomaines may continue, must represent a certain gain to the economy, and, therefore, an active reinforcement of the patient's strength. I therefore wish to advocate surgical interference, *within reasonable limits*, whenever we may anticipate the establishment of more favorable conditions for the patient. Happily, the streptococci show such a decided preference for localization in the joints that complications in other organs, if not far advanced, may retrograde, leaving the osteomyelitic foci the only menaces to life.

In conclusion, I offer the following considerations by way of recapitulation, and as therapeutic measures governing the conduct of the class of cases under discussion:

Since, in certain cases of acute suppurative joint affections, generally polyarticular, and occurring especially after distant wounds or inflammations of exposed surfaces, it is now established that we have to deal with an occult osteomyelitis involving the joints secondarily, but producing no clinical symptoms over the primary foci, and due to a streptococcus invasion of the system, I contend that these cases be considered as eminently surgical cases, and as proper objects for treatment in our surgical clinics.

Hitherto the pathology of these cases has not been fully recognized; they have been regarded in the light of septico-pyæmia, and have, from our present point of view, been neglected or inadequately treated. Not only the joint cavities containing purulent effusions should be attacked, but the real foci of the disease situated in the bone marrow of the neighboring bones as well, and these chiefly.

This attack should be made at as early a date as possible, so as to prevent a greater destruction of tissues than is avoidable, and especially of the epiphyseal cartilages and of the periosteum.

For this reason active measures should be taken to examine into the condition of the bone by incisions along the shaft; and if the diaphysis appears partly or wholly necrotic, or if the periosteum appears loosened from it

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and inflamed, as much as is deemed necessary should be subperiosteally removed.

This resolve should not be influenced by the apprehension that subsequently adequate reproduction of the bone may not take place. If this should happen, the help of auxiliary apparatus must be invoked, and especially for shortening, or a secondary amputation done when the patient has regained his strength.

Nor should the fact that the epiphyseal cartilages have become arroded and disintegrated be allowed to interfere with the extraction of the foci of osteomyelitis, for it is of the first importance to remove from the system all hotbeds for the propagation of toxines. Only the diaphysis should, however, be removed through the longitudinal incision. The cartilages should be treated in conjunction with the joint.

The joints should, at the same time, be treated by free evacuation and drainage; if they be found completely disorganized, resection or arthrectomy should be done according to general surgical principles. As much as possible should be saved. Arroded or partially destroyed cartilages should be treated by gouging, with preservation, if possible, of the epiphyseal line.

The technique, as well as the indications, will differ for the various joints.

Thus, for simple suppuration of the knee joint in the graver forms of osteomyelitis, it will suffice to open the joint by longitudinal incisions on either side anteriorly to the lateral ligaments, the incisions also invading the large bursa under the quadriceps tendon.

For the hip joint, however, the same affection will demand exsection of the head of the femur, because otherwise it is not possible to secure thorough drainage of the infected cavity.

The astragalo-crural articulation cannot be sufficiently drained after simple arthrotomy, so that partial excision of one or the other malleolus is indicated.

The shoulder joint may be exsected for suppurative

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disorganization with more propriety in the adult, in order to prevent the ankylosis which would result after simple arthrotomy; but since in children interference with the epiphysis of the humerus means almost complete arrest of development of the bone, we may hesitate to do more than simple arthrotomy. Happily the shoulder joint appears to be less frequently attacked than the other joints. In most cases the elbow and wrist joints can likewise be sufficiently drained only after partial excisions, owing to their complex anatomical formation.

As to the smaller joints of the hand and foot, no general rules can be laid down; very rarely, I believe, will amputation be called for. Such smaller bones as are attacked may be taken out subperiosteally, if possible. If the joints cannot be properly drained exsection is here indicated. The smaller foci, however, do not threaten the economy in the same measure as do the foci in larger bones, and oftentimes we see an attacked small bone recover from its inflammation without necrosis.

As to the choice of antiseptic methods and dressings in these operations little need be said. Active antisepsis is to be preferred to simple asepsis, as affording more success in combating the septic processes we are attacking. Sublimate, carbolic acid, and especially iodoform, however, should be avoided in the cases of young children, as too readily leading to intoxication in their prostrated condition. Creolin, in one- or two-per-cent solutions, freshly prepared, has proved satisfactory to me in the cases here alluded to, especially when we cannot be certain of removing all the irrigating fluid from the joint cavity.

DISCUSSION.

DR. F. S. DENNIS related an interesting case in which the Staphylococcus pyogenes albus had caused an osteomyelitis affecting the tibia in a lad, whom he presented at the meeting, and who had been brought to Bellevue Hospital from the Chambers Street Hospital under the supposition that the disease from which the boy was suf-

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fering was typhoid fever. The boy entered Dr. Dennis' ward, having been transferred from the medical ward to which he had been admitted; and while the symptoms were much like those of typhoid fever, there was one which led him to explore the tibia. The symptom was excruciating pain in the tibia, and on cutting down upon the bone nothing abnormal was found until it was trephined, when pus welled up from the interior. He gouged out the medullary canal, thoroughly cleansed it, packed it with iodoform gauze, and the boy had practically recovered. The pus contained only the Staphylococcus pyogenes albus, whereas the rule was to find in osteomyelitis and joint affections the Staphylococcus pyogenes aureus.

DR. A. G. GERSTER said he had been much instructed by the papers; that he was glad to learn of the distinctions between the several forms of osteomyelitis, according as they were caused by the Staphylococcus albus, aureus, the Streptococcus, etc.; and, with the light thrown upon one of these forms by the authors, he would feel bolder in treating them according to principles of advanced surgery.

DR. GIBNEY related his experience with cases of what clinically seemed to have been streptococcus osteomyelitis, in one of which he was surprised, owing to the low condition of the patient, to find that she recovered after several operations on the long bones.

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SCIENTIFIC WORK

IN THE

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SECTION ON GENERAL MEDICINE.

JANUARY, 1891.—R. C. M. Page, M.D. Paper: "Pulmonary tuberculosis and its relations to pneumonia." Published, Med. Record, 1891, xxxix., 185.

W. P. Northrup, M.D. Paper: "Primary infection of the bronchial glands in pulmonary tuberculosis." Published, N. Y. Med. Jour., 1891, liii., 201. Discussion: Drs. J. W. Roosevelt, W. H. Thomson, and F. Delafield.

FEBRUARY, 1891.—J. Blake White, M.D. Paper: "Value of subcutaneous inoculations of chloride of gold and iodide of manganese in tubercular disease." Published, Med. Record, 1891, xxxix., 338, 354. Discussion: Drs. Jas. R. Leaming, S. H. Dessau, H. S. Norris, W. C. Jarvis, and F. Delafield.

Jas. R. Leaming, M.D. Paper: "Cough." Published, Med. Record, 1891, xxxix., 336, 355.

MARCH, 1891.—The Section assumed direction of the second meeting of the Academy, and presented the subject of "Malaria and its occurrence in New York." Papers: (1) Opening paper, by Dr. Walter B. James; (2) Pathology, by Drs. H. M. Biggs and J. D. Byron; (3) Clinical aspects, by Drs. A. Jacobi, W. H. Thomson, A. B. Ball, and F. Delafield; (4) Manifestations in children, by L. E. Holt.

APRIL, 1891.—H. Ling Taylor, M.D. Paper: "American childhood from a medical standpoint." Published, Popular Science Monthly, Oct., 1892. Discussion: Drs. F. Delafield, R. C. M. Page, F. A. Castle, and C. E. Quimby.

W. H. Porter, M.D. Paper: "Fel bovis as a thera-

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peutic measure." Published, Med. News, 1891, lviii., 48. Discussion: Drs. A. Zeh, F. A. Castle, and S. Lloyd.

F. W. Jackson, M.D. Paper: "Value of auscultatory percussion." Published, N. Y. Med. Jour., 1891, liii., 709. Discussion: Drs. J. W. Roosevelt and G. R. Lockwood.

MAY, 1891.—T. E. Satterthwaite, M.D. Paper: "Pulmonary syphilis." Published, Bost. Med. and Surg. Jour., 1891, cxxiv., 573, 600. Discussion: Drs. R. W. Taylor, W. H. Welch of Baltimore (by letter), L. Weber, and W. H. Porter.

H. N. Heineman, M.D. Paper: "Prognosis in certain forms of cardiac disease."

OCTOBER, 1891.—J. W. Brannan, M.D. Paper: "Essential paroxysmal tachycardia." Published, Med. Record, 1891, xl., 701. Discussion: Drs. C. L. Dana, W. G. Thompson, E. D. Fisher, M. P. Jacobi, W. Vought.

M. P. Jacobi, M.D. Paper: "Functional disturbances of the heart and pulse." Not published. Discussion: Drs. W. G. Thompson, W. Vought.

NOVEMBER, 1891.—Beverley Robinson, M.D. Paper: "Creosote in the treatment of pulmonary phthisis." Published, Med. Record, 1892, xli., 229. Discussion: Drs. Glasgow of St. Louis, E. L. Trudeau (both by written communication), Drs. W. G. Thompson, W. H. Flint, C. E. Quimby, L. Weber, and R. C. M. Page.

DECEMBER, 1891.—H. P. Loomis, M.D. Paper: "The processes which result in the cure of pulmonary phthisis." Published, Med. Record, 1892, xli., 29, 105. Discussion: Drs. J. W. Roosevelt and F. Delafield.

C. E. Quimby, M.D. Paper: "Exact records of physical signs." Not published. Discussion: Dr. F. W. Jackson.

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SECTION ON GENERAL SURGERY.

JANUARY 12TH, 1891.—R. F. Weir, M.D., exhibited a patient from whom he had removed two vesical calculi and the middle lobe of the prostate by suprapubic incision; also a patient whom he had successfully trephined for traumatic epilepsy. Discussion: Dr. W. Meyer.

A. G. Gerster, M.D., exhibited a patient from whom he had removed biliary calculi by cystotomy. Discussion: Drs. Weir, Curtis, and Abbe.

Willy Meyer, M.D., showed a patient wearing an artificial larynx, whose larynx he had removed for epithelioma. Discussion: Drs. Gerster, Weir, and Powers.

L. B. Bangs, M.D., presented a simple apparatus for suprapubic drainage.

W. R. Townsend, M.D., exhibited a girl who could at will throw the patella to the outer side, and again replace it; also a woman with recurring luxation of the lower jaw. Discussion: Drs. Ridlon, Kammerer, and Ketch.

B. F. Curtis, M.D., exhibited a patient who had sustained a refracture of the lower end of the radius fifty-five days after the original injury.

FEBRUARY, 1891.—This meeting was held under the auspices of the Academy at a general meeting.—J. D. Bryant, M.D. Paper: "Operative treatment of subclavian aneurism." (First two portions.) (See page 49.)

MARCH 9TH, 1891.—R. Abbe, M.D., exhibited a patient on whom Thiersch's skin-grafting had been done for the cure of a large ulcer of the forearm. Discussion: Drs. R. H. Sayre and Willy Meyer.

F. Kammerer, M.D., read a report of three cases of nephrectomy. Published, Med. Record, 1891, xxxiv., 368. Discussion: Dr. Willy Meyer.

R. F. Weir, M.D., exhibited a set of Charles Sy-

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mond's œsophageal tubes, one of which had been lost in the œsophagus; also a spleen which had been removed for gunshot wound, the wound being complicated by shot wound of the splenic flexure of the colon; also a kidney which he had removed for cystic carcinoma.

R. W. Amidon, M.D. Paper: "Danger of administering chloroform in the presence of an open flame." Not published. Discussion: Drs. Weir, Abbe, Willy Meyer, Van Arsdale, Armstrong, Kammerer, Bull, Amidon, and Agramonte.

Willy Meyer, M.D., demonstrated a new cystoscope of French make, the instrument permitting irrigation of the bladder and catheterism of the ureters. Discussion: Drs. Tuttle, Manley, and Kammerer.

W. W. Van Arsdale, M.D., exhibited a new form of thumb forceps.

APRIL 13TH, 1891.—J. A. Wyeth, M.D., exhibited a patient showing the correction of deformity of the nose in cleft of the hard palate.

S. E. Milliken, M.D. Paper: "The treatment of hernia with the 'Hank Truss.'" Published, Med. Record, 1891, xxxix., 616.

J. William White, M.D. Paper: "The curative effect of operations *per se*." Published, Ann. Surg., 1891, xiv., 81.

APRIL 27TH, 1891.—W. R. Townsend, M.D., exhibited a patient with exostosis of the frontal bone.

A. M. Phelps, M.D., exhibited patients showing: (1) Reproduction of tendons from catgut; (2) Reproduction of bone from blood clot; (3) Laparotomy for intestinal obstruction.

W. B. Coley, M.D. Paper: "A case of sarcoma of metacarpus with rapid generalization." Published, Annals Surg., 1891, xiv., 199.

R. H. M. Dawbarn, M.D. Paper: "A vegetable plate: a new method in intestinal anastomosis." Published, Med. Record, 1891, xxxix., 725. Discussion: Drs. Abbe, Weir, and Curtis.

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MAY 11TH, 1891.—S. Lloyd, M.D., exhibited a patient showing "osteosarcoma of finger with secondary growths."

T. H. Manley, M.D., read a report on "Gunshot wounds of the cranial, pleural, and abdominal cavities." Published, Med. Record, 1891, xl., 65.

D. P. Allen, M.D., of Cleveland, O. Paper: "Drainage in abdominal operations." Published, N. Y. Med. Jour., 1891, liii., 691. Discussion: Drs. Thomas, Lee, Polk, Bryant, Nicoll, Cleveland, Coe, and others.

OCTOBER 12TH, 1891.—W. Meyer, M.D., exhibited a patient on whom he had done Phelps' operation for talipes equino-varus; also a patient on whom he had done von Hacker's operation for cancer of stomach.

A. M. Phelps, M.D., exhibited patients on whom he had operated for clubfoot. Discussion: Drs. Gibney, Sayre, Meyer, Ketch, and Abbe.

C. A. Powers, M.D., exhibited a specimen of dermatol. Dr. Abbe testified to its good effects.

B. F. Curtis, M.D. Paper: "Laparotomy for acute intussusception." Published, Med. Record, 1891, xl., 534.

E. M. Mosher, M.D. Paper: "A critical study of the biceps muscle in its relation to diseases in and around the knee joint." Published, Ann. Surg., 1891, xiv., 356. He demonstrated several wet and dry specimens of dissected knee joints.

NOVEMBER 9TH, 1891.—V. P. Gibney, M.D., exhibited four patients showing results after tubercular osteitis of the knee.

B. F. Curtis, M.D., showed a patient on whom he had implanted bone for the relief of a fractured leg attended by non-union.

A. J. McCosh, M.D., exhibited a patient whom he had trephined for a large extradural clot.

C. A. Powers, M.D., exhibited a patient on whom he

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had done Thiersch's skin-grafting after removal of a papilloma nasi. Discussion: Drs. Bull, Syms, Dawbarn, Bryant, Manley, C. N. D. Jones.

L. B. Bangs, M.D. Paper: "Some limitations attending the use of the cystoscope." Published, Post-Graduate, 1892, vii., 303. Discussion: Drs. W. K. Otis, W. Meyer.

R. H. M. Dawbarn, M.D. Paper: "Some considerations on the treatment of hæmorrhage." Published, Med. Record, 1892, xli., 1.

DECEMBER 14TH, 1891.—B. B. Gallaudet, M.D., reported two cases of cerebral abscess cured by opening the skull and drainage, exhibiting one of the patients. Discussion: Dr. R. F. Weir.

R. F. Weir, M.D., exhibited a specimen of aortic aneurism treated by MacEwen's method of inserting needle in the sac and "scratching" the posterior wall. Discussion: Dr. J. D. Bryant, who had used this method in a case of iliac aneurism.

F. Kammerer, M.D. Paper: "A case of sacral hysterectomy." Published, Med. Record, 1892, xli., 207. Discussion: Drs. Lange, H. J. Boldt, Currier, and Edebohls.

SECTION ON GENITO-URINARY SURGERY.

In addition to the patients shown, clinical reports and pathological specimens presented, the following papers were read and discussed before the Section during 1891.

FEBRUARY.—Samuel Alexander, M.D. Paper: "Papillary adeno-carcinoma of the bladder, with observations upon the diagnosis of small papillary fibromata." Published, Jour. Cutan. and Gen-Urin. Dis., 1891, ix., 86. Discussion: Drs. W. T. Otis, L. B. Bangs, and F. T. Brown.

G. H. Fox, M.D. Paper: "Remarks upon the diagnosis of cutaneous syphilis." Not published. Dis-

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cussion: Drs. P. A. Morrow, R. W. Taylor, F. T. Brown, G. T. Brewer, and Samuel Alexander.

Geo. T. Brewer, M.D. Paper: "The contagiousness of chronic gonorrhœa." Published, Jour. Cutan. and Gen-Urin. Dis., 1891, ix., 81. Discussion: Drs. Sturgis, Bache Emmet, W. T. Otis, F. T. Brown, P. A. Morrow, S. Alexander, and R. W. Taylor.

MARCH.—J. E. Kelly, M.D. Paper: "'Kochism' in the treatment of genito-urinary tuberculosis." Published, N. Y. Med. Jour., 1891, liii., 554. Discussion: Drs. Keyes and F. T. Brown.

J. B. Gibbs, M.D. Paper: "Ulceration of the rectum." Discussion: Drs. Hartley, Syms, Tuttle, and Bingham of Burlington, Vt.

Frank Hartley, M.D. Paper: "Chancre of the rectum; report of a case." Not published.

F. Tilden Brown, M.D. Paper: "Ocular and tactile demonstration of urethral lesions by the aid of new instruments." Published, Jour. Cutan. and Gen.-Urin. Dis., 1891, ix., 245. Discussion: Drs. Fordyce, Keyes, E. Fuller, Brewer, Taylor, and Alexander.

Samuel Alexander, M.D. Paper: "Vesical calculi with bony nuclei, encysted prostatic calculus; report of case." Published, Jour. Cutan. and Gen.-Urin. Dis., 1891, ix., 210.

APRIL.—Dr. A. F. Currier. Paper: "Gonorrhœa in women." Not published. Discussion: Drs. Keyes, Taylor, Brewer, Vander Poel, and Sturgis.

Samuel Alexander, M.D. Paper: "An observation upon the treatment of epididymitis." Published, Jour. Cutan. and Gen.-Urin. Dis., 1891, ix., 455. Discussion: Drs. Bangs, Brewer, Morrow, and Taylor.

L. Bolton Bangs, M.D. Paper: "Notes upon vesical tuberculosis." Published, Jour. Cutan. and Gen.-Urin. Dis., 1892, x., 173. Discussion: Drs. Sturgis, Alexander, Morrow, and Taylor.

NOVEMBER.—Willy Meyer, M.D. Paper: "Nephrolithotomy and suprapubic cystotomy in the same

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person." Published, N. Y. Med. Jour., 1892, liii., 144.

Dr. Guiteras. Paper: "Nitrate of silver in the treatment of gonorrhœa." Published, Jour. Cutan. and Gen.-Urin. Dis., 1892, x., 155. Discussion: Drs. Bangs, Taylor, Otis, and Brewer.

DECEMBER.—C. W. Allen, M.D. Paper: "The tannate of mercury in the treatment of syphilis." Published, Med. Rec., 1892, xli., 6.

S. Lustgarten, M.D. Paper: "The tannate of mercury in the treatment of syphilis." Published, N. Y. Med. Jour., 1892, lv., 292. Discussion: Drs. Morrow, Koplik, and Taylor.

R. W. Taylor, M.D. Paper: "Chancres in women." Published, N. Y. Med. Jour., 1892, lv., 1. Discussion: Drs. Morrow, Bangs, and Fordyce.

SECTION ON ORTHOPÆDIC SURGERY.

JANUARY 16TH, 1891.—Reginald H. Sayre, M.D. Paper: "The necessity of thorough examination in suspected Pott's disease." Not published.

FEBRUARY 20TH, 1891.—A. M. Phelps, M.D. Paper: "Excision of the knee as an orthopædic measure." Not published.

Samuel Lloyd, M.D. Paper: "Laminectomy for Pott's paraplegia." Published, Ann. Surg., Oct., 1892.

MARCH 20TH, 1891.—H. L. Taylor, M.D. Paper: "Adjusted locomotion in the treatment of the recovering stage of hip-joint disease." Published, N. Y. Med. Jour., July 11th, 1891.

APRIL 17TH, 1891.—R. W. Lovett, M.D., of Boston, by invitation. Paper: "The place of fixation in the traction treatment of hip disease." Published, N. Y. Med. Jour., August 8th, 1891.

MAY 15TH, 1891.—Newton M. Shaffer, M.D. Paper: "What are the indications for the discontinuance

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of the mechanical treatment of hip-joint disease? With remarks on symptoms and treatment." Published, N. Y. Med. Jour., November 28th, 1891.

OCTOBER 16TH, 1891.—Wisner R. Townsend, M.D. Paper: "The necessity for early medical treatment in infantile paralysis." Published, N. Y. Med. Record, January 30th, 1892.

NOVEMBER 20TH, 1891.—Chas. L. Scudder, M.D., of Boston, by invitation. Paper: "A study of one of the etiological factors of lateral curvature of the spine." Published by the city of Boston as school document No. 9 on "The seating of pupils in the public schools."

James E. Kelly, M.D., by invitation. Paper: "Animal locomotion, and the anatomy of talipes." Not published.

DECEMBER 18TH, 1891.—Royal Whitman, M.D. Paper: "A consideration of some of the affections of tendon sheaths and bursæ, and their relations to injuries and diseases of the joints." Published, Med. Record, April 2d, 1892.

SECTION ON OPHTHALMOLOGY AND OTOLOGY.

JANUARY 19TH, 1891.—J. B. Emerson, M.D. Paper: "A contribution to the study of the treatment of detachment of the retina." Published, N. Y. Med. Jour., 1891, liii., 330.

David Webster, M.D. Paper: "Puncture of the globe with Gräfe's knife for detachment of the retina." Published, N. Y. Med. Jour., 1891, liii., 326. Discussion of the two papers combined: Drs. Andrews, Pooley, Knapp, Pomeroy, and Noyes.

FEBRUARY 16TH, 1891.—D. W. Hunter, M.D. Paper: "Keratitis numularis." Not published. Discussion: Drs. Callan and Pomeroy.

MARCH 16TH, 1891.—D. B. St. John Roosa, M.D. Paper: "Experiences in cataract extraction." Published,

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Archiv. Ophthalmol., 1891, xx., 207. Discussion: Drs. Webster, Knapp, and Noyes.

APRIL 20TH, 1891.—J. H. Claiborne, M.D. Paper: "The actual cautery in corneal affections." Published, N. Y. Med. Jour., 1891, liii., 624. Discussion: Drs. Webster, Seabrook, and Noyes.

A. E. Davis, M.D. Paper: "Contagious diseases of the eye; statistics and remarks." Published, Med. Rec., 1891, xl., 29. Discussion: Drs. Roosa, Derby, Callan, and Noyes.

MAY 18TH, 1891.—H. H. Seabrook, M.D. Paper: "The natural course of cataract." Published, Med. Rec., 1891, xl., 294. Discussion: Drs. Webster, Noyes, and Agramonte.

J. E. Weeks, M.D. Paper: "La grippe in the production of retrobulbar neuritis and other ocular nerve lesions." Published, N. Y. Med. Jour., 1891, liv., 143. Discussion: Drs. Koller, Knapp, Pooley, and Webster.

W. A. Holden, M.D. Paper: "A case of carcinoma of the choroid." Published, Arch. Ophthal., 1892, xxi., 1. Discussion: Dr. Webster.

OCTOBER 19TH, 1891.—No regular paper was presented, but cases were reported and discussed by Drs. Weeks, Norton, Roberts, Seabrook, Valk, Knapp, and Johnson.

NOVEMBER 16TH, 1891.—W. A. Holden, M.D. Paper: "Clinical notes on pallor of the temporal half of the optic disc." Not published. Discussion: Drs. Knapp and Noyes.

DECEMBER 21ST, 1891.—F. Valk, M.D. Paper: "A case of tonic spasm of the accommodation." Published, N. Y. Med. Jour., 1892, lv., 408. Discussion: Drs. Noyes, Alleman, Sutphen, and Weeks.

Many cases were presented and discussed, a number of new instruments and a number of pathological specimens were exhibited, during the year.

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SECTION ON LARYNGOLOGY.

JANUARY 27TH, 1891.—H. H. Curtis, M.D., presented a case of lupus extending from the angle of the jaw to the median line of the neck, which had been nearly healed by the Koch treatment.

W. C. Phillips, M.D., exhibited a Cotton reservoir, which he considered a labor-saving device for office use.

W. C. Bailey, M.D. Paper: "The possibilities of paratoloid in the treatment of laryngeal phthisis." Discussion: Drs. A. H. Smith, W. C. Jarvis, C. C. Rice, Warner, Heineman, Curtis, Blake White, and Gibier.

FEBRUARY 24TH, 1891.—H. H. Curtis, M.D., exhibited an appliance to prevent mouth-breathing.

J. E. Nichols, M.D., related the history of a case of recurrent nasal fibroma springing from the middle turbinated bone.

J. W. Gleitsmann, M.D., reported a case of hoarseness without dyspnœa of five years' standing, due to an intralaryngeal growth springing from various portions of the larynx.

H. H. Curtis, M.D., exhibited four patients with intralaryngeal growths.

D. H. Goodwillie, M.D. Paper: "Fibroid growths of the naso-pharynx, and the method of their removal by electro-cautery." Published, N. Y. Med. Jour., 1892.

MARCH 24TH, 1891.—R. C. Myles, M.D., presented a pair of alligator punch forceps for removing portions of hypertrophied middle turbinated bone.

C. C. Ransom, M.D., reported a case of a patient from whom he had removed a triangular-shaped piece of glass which had lodged in the glottis.

D. Phillips, M.D., read a clinical note on ichthyol and keraline in treatment of dry rhinitis. Discussion: Dr. Quinlan.

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Dr. F. J. Quinlan, M.D. Paper: "A case of convergent squint corrected by a modified operation upon deflected septum." Published, Med. Record, 1891, xxxix., 619. Discussion: Dr. Bucklin.

J. Wright, M.D. Paper: "Tracheal syphilitis, with report of two cases." Published, N. Y. Med. Jour., 1891, liii., 672. Discussion: Drs. Vander Poel, R. C. Myles, and W. K. Simpson.

APRIL 28TH, 1891.—Geo. Scott, M.D., presented a case of paralysis of left vocal cord, palate, and dysphagia following stab wound behind the left sterno-cleido-mastoid.

W. C. Phillips, M.D. Paper: "Aristol in the treatment of the nose and throat." Published, N. Y. Med. Jour., 1891, liii., 591. Discussion: Drs. Pomeroy, Douglas, Roberts, Wright, and Jarvis.

Discussion. Subject: "The etiology and treatment of catarrhal deafness, as viewed from the standpoint of the otologist or rhinologist." Participated in by Drs. Bosworth, Roosa, Robinson, Pomeroy, and Rice.

MAY 26TH, 1891.—J. W. Gleitsmann, M.D., reported a case of sarcoma of the tonsil following la grippe.

B. F. Westbrook, M.D. Paper: "Trigeminal neuralgia in relation to nasal diseases." Not published. Discussion: Drs. Wright, Curtis, Gleitsmann, Freudenthal, Leszynsky, Myles, Jeffrey.

OCTOBER 28TH, 1891.—F. E. Hopkins, M.D. Paper: "Intubation for the relief of stenosis in tubercular laryngitis." Published, N. Y. Med. Jour., 1892, lv., 234. Discussion: Drs. Wright, Knight, Simpson, and Douglas.

NOVEMBER 25TH, 1891.—W. F. Chappell, M.D., presented a guillotine for the removal of hypertrophies at the base of the tongue. Discussion: Dr. L. A. Coffin.

T. M. Berens, M.D., exhibited cork tubes which he had used after operation for a deflected septum.

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D. B. Delavan, M.D., described a new method of administering potassium iodide. Discussion: Dr. W. C. Phillips.

J. Blake White, M.D., exhibited a double nasal spray.

W. F. Chappell, M.D. Paper: "Œsophageal stricture treated by permanent tubage." Published, Med. Record, 1892, xli., 205. Discussion: Drs. Weir, B. F. Curtis.

DECEMBER 23D, 1891.—C. C. Rice, M.D., presented for Dr. Barton a case of "dislocation of the larynx."

Discussion: "The treatment of hypertrophies and deflections of the nasal septum," Drs. C. C. Rice, W. C. Jarvis, H. H. Curtis, O. B. Douglas, Max Toeplitz, Wendell C. Phillips, and J. W. M. Kitchen.

SECTION ON OBSTETRICS AND GYNÆCOLOGY.

JANUARY 22D, 1891.—H. J. Boldt, M.D., presented specimen of ectopic gestation.

Andrew F. Currier, M.D. Paper: "Under what conditions may electricity be of positive service to the gynæcologist?" Published, New Eng. Med. Month., 1891, x., 354.

A. H. Goelet, M.D. Paper: "The treatment of menorrhagia and metrorrhagia by the galvano-caustic action of the positive pole." Published, Med. Record, 1891, xxxix., 366. Discussion of both papers: Drs. Massey (of Philadelphia), Gunning, Boldt, Wylie, Chambers, Edebohls, Goffe, Krug, Vineberg, McLean, Morton, the Chairman, Currier.

FEBRUARY 26TH, 1891.—F. Krug, M.D., presented specimen of colloid tumor.

A. F. Currier, M.D., reported case of ventral fixation of retroflexed uterus.

P. J. McCahey, M.D., of Philadelphia, presented and demonstrated his pneumatic tractor as a substitute

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for the forceps. Discussion: Drs. McLean, Murray, Edgar, Emerson, Hance, Collyer, Forest, Grandin, McCahey.

MARCH 26TH, 1891.—A. H. Goelet, M.D., presented pathological specimens.

A. F. Currier, M.D., exhibited hairpin removed from bladder of young girl.

T. J. McGillicuddy, M.D., presented abnormal placenta, with blood clot attached to membranes.

Malcolm McLean, M.D. Paper: "The placenta, funis, and membranes; some remarks on their influence in gestation and parturition." Discussion: Drs. Jewett, M. P. Jacobi, Waldo, Edgar, Grandin, McLean.

Grace Peckham, M.D. Paper: "Pessaries and their abuses." Not published. Discussion: Drs. Boldt, Goelet, Waldo, M. P. Jacobi, Murray, Vineberg, Edebohls, Collyer, Agramonte, Peckham.

APRIL 23d, 1891.—J. C. Edgar, M.D., presented an Auvard incubator recently received from Paris. Remarks by Drs. Grandin and McGillicuddy.

M. McLean, M.D., reported case of cystic degeneration of kidney. Discussion: Drs. Goffe and Grandin.

C. E. Locke, M.D., reported case of encapsulated blood clots of vulva, and death of patient from shock. Discussion: Drs. Grandin, McLean, and Collyer.

M. McLean, M.D., reported case of atresia of vagina complicating labor. Discussion: Drs. Grandin, Krug, and R. A. Murray.

F. Krug, M.D., reported case of atresia of vagina following scarlatina.

R. A. Murray, M.D. Paper: "The association of rectal and pelvic disease in the female." Published, Arch. Gynec. and Obstet., 1891, vi., 315. Discussion: Drs. Boldt, Krug, Goelet, Collyer, Goffe, McLean, and Heydecker.

MAY 28TH, 1891.—Bache McE. Emmet, M.D., presented

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a new broad-ligament clamp, also trocar for carrying drainage tube.

H. C. Coe, M.D. Paper: "The care of the bladder in the pregnant and parturient female." Published, Amer. Jour. Obstet., 1891, xxiv., 769. Discussion: Drs. Boldt, Hanks, Cleveland, Murray, Bache McE. Emmet, Abbott, Collyer, Polk, and Grandin.

Florian Krug, M.D. Paper: "Personal experience with vaginal hysterectomy." Published, Amer. Jour. Obstet., 1891, xxiv., 796. Discussion: Drs. Polk, Hanks, Coe, Janvrin, Boldt, Cleveland, Emmet, Edebohls, Kammerer, and Grandin.

OCTOBER 22D, 1891.—W. G. Wylie, M.D., presented two specimens. 1. Third kidney in broad ligament. 2. Pelvic abscess.

F. Foerster, M.D., demonstrated a portable operating table.

J. Henry Fruitnight, M.D. Paper: "Puerperal phlegmasia alba dolens." Published, N. Y. Jour. Gynec. and Obstet., 1891, i., 97. Discussion: Drs. Wylie, Buckmaster, R. A. Murray, Schmidt, and Grandin.

F. Spencer Halsey, M.D. Paper: "Report of a case of intestinal obstruction following operation for stenosis of the cervix." Not published. Discussion: Drs. Wylie, Murray, Buckmaster, Locke, and Grandin.

NOVEMBER 17TH, 1891.—E. B. Kerley, M.D., read the history and presented a case of vicarious menstruation.

E. H. Grandin, M.D., reported four cases of vicarious miscarriage. Discussion: Drs. Grandin, C. S. Cole, Edebohls, Wallace, and Vineberg.

C. S. Cole, M.D. Paper: "A clinical record: ectopic gestation." Published, N. Y. Jour. Gynec. and Obstet., 1892, ii., 31. Discussion: Drs. Vineberg, Murray, Boldt, Edebohls, Jarman, and Grandin.

R. A. Murray, M.D., presented pathological specimens.

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H. S. Locke, M.D. Paper: "The treatment of incomplete abortion at the Roosevelt Hospital." Published, N. Y. Jour. Gynec. and Obstet., 1892, ii., 24. Discussion: Drs. Murray, Edgar, and Grandin.

DECEMBER 16TH, 1891.—H. C. Coe, M.D., presented pathological specimens.

H. T. Hanks, M.D., reported a case.

G. W. Jarman, M.D. Paper: "Intraligamentous rupture of ectopic gestation, and its expectant treatment." Published, N. Y. Journ. Gynec. and Obstet., 1892, ii., 310. Discussion: Drs. Coe, Hanks, Cragin, and Locke.

H. J. Boldt, M.D. Paper: "Suppurative Oöphoritis." Published, N. Y. Jour. Gynec. and Obstet., 1892, ii., 289. Discussion: Drs. Edebohls, Coe, Buckmaster, Goelet, Jarman, Hanks, Waldo, and Murray.

SECTION ON PÆDIATRICS.

JANUARY 15TH, 1891.—Stated meeting of the Academy, in charge of Section on Pædiatrics.

Paper: "Cervical adenitis in children." Etiology, symptomatology, and diagnosis, A. Jacobi, M.D.; Treatment, W. H. Thomson, M.D. Discussion: Drs. A. G. Gerster, B. F. Curtis, W. W. Van Arsdale, and Henry Koplik. (See page 1.)

MARCH 12TH, 1891.—H. Koplik, M.D. Specimens of urethral calculi.

J. Dorning, M.D. Presentation of small silver catheter for obtaining specimens of urine from children.

J. L. Smith, M.D. Paper: "Contributions to knowledge of diphtheria during 1890." Not published. Discussion: Drs. Koplik, Seibert, Winters, Dessau, and Berg.

A. Caillé, M.D. Paper: Report of Tenth International Medical Congress. Not published.

APRIL 9TH, 1891.—Subject for discussion: "The prevention of diphtheria." Introductory remarks, Dr.

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Caillé. Present knowledge of the subject, J. L. Smith, M.D. Letter from Dr. J. D. Bryant. Cause and prevention, T. M. Prudden, M.D. Not published. Discussion: Drs. A. Jacobi, H. D. Chapin, L. E. Holt, Bruce, Seibert, and Berg.

MAY 14TH, 1892.—Presentation: Two cases of incipient Basedow's disease, A. Koplik. Discussion: Drs. A. Jacobi and Agramonte.

J. A. Andrews, M.D. Paper: "Asthenopia in children." Published, N. Y. Med. Jour., 1891, liv., 41. Discussion: Dr. R. H. Derby.

Louis Fischer, M.D. Paper: "Naso-pharyngeal catarrh as a causative factor in gastric catarrh." Published, Med. Rec., 1891, xxxix., 674. Discussion: Drs. A. Jacobi and W. P. Northrup.

A. Brothers, M.D. Paper: "Relation of dentition to various pathological conditions." Published, Archiv. Pædiatrics, 1891, viii., 582. Discussion: Drs. J. L. Smith, Berg, A. Jacobi, and Rachel.

G. W. Rachel, M.D. Paper: "Polyuria in children." Read by title. Published, Med. and Surg. Reporter, 1891, lxv., 650.

NOVEMBER 12TH, 1891.—Louis Fischer, M.D. Paper: "Demonstration of Soxhlet's modified milk sterilizer."

W. L. Carr, M.D. Report of meeting of American Pædiatric Society.

W. H. Porter, M.D. Paper: "The physiological importance of the proximate principles and their practical utility in the food stuffs and in the nutritive processes of the body." Published, Amer. Jour. Med. Sciences, civ., 300. Discussion: Drs. W. H. Thomson, Zeh, and Fruitnight.

SECTION ON NEUROLOGY.

APRIL 15TH, 1891.—C. K. Mills, M.D., of Philadelphia. Paper: "Ophthalmoplegia from gross lesions." Discussion: Drs. Sachs, Dana, Birdsall, and Leszynsky.

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B. Sachs, M.D. Paper: "Syphilis of the central nervous system: a pathological and clinical study." Published, N. Y. Med. Jour., 1891, liv., 309. Discussion: Drs. C. K. Mills, Starr, Dana, Birdsall, Rockwell, and Fisher.

OCTOBER 15TH, 1891.—B. Sachs, M.D. Paper: "The medical and surgical treatment of epilepsy." Published, Jour. of Nervous and Mental Diseases, 1891, xviii., 841. Discussion: Drs. Dana, Wyeth, Birdsall, Starr, Fisher, and Hammond.

SECTION ON PUBLIC HEALTH, ETC.

FEBRUARY 6TH, 1891.—Henry D. Chapin, M.D. Paper: "The hygienic conditions of the public schools." Published, Transactions of Med. Soc. County of New York, 1891. Discussion: Superintendent of Construction of New York Public Schools.

MARCH 18TH, 1891.—Andrew F. Currier, M.D. Paper: "The unrestricted evil of prostitution." Published, Philanthropist, May, 1891. Discussion: Drs. E. L. Keyes, F. R. Sturgis, W. M. McLaury, E. Blackwell, R. W. Taylor, Palmer Dudley of Louisville, the Rev. Dr. Da Costa, and Aaron Powell, Esq.

The Section adopted a resolution condemning the proposed transformation of the 42d street reservoir into an air garden.

MAY 8TH, 1891.—F. R. Sturgis, M.D. Paper: "The proper disposition of stable manure." Not published. Discussion: Drs. St. John Roosa, Stephen Smith, Hadden, and Maj. Bullard.

H. W. Mitchell, M.D. Paper: "The drainage of cities and its influence on public health." Published, Med. Record, 1891, xl., 39. Discussion: Drs. A. F. Currier and Alex. Hadden.

OCTOBER 21ST, 1891.—D. Lewis, M.D. Paper: "International and interstate quarantine." Not published. Discussion: Drs. W. M. Smith and S. T. Armstrong.

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T. Darlington, M.D. Paper: "The climate of Southern Arizona." Published, Climatologist, 1892, ii., 265. Discussion: Drs. Birdsall, Sells, and Hadden.

NOVEMBER 18TH, 1891.—Stephen Smith, M.D. Paper: "The office of coroner, with suggestions of reform in the city of New York." Published, Med. Record, 1892, xli., 57. Discussion: Drs. Wooster Beach, Philip Donlin, Hoyt, Alex. Hadden, and Messrs. Theodore H. Tyndale and Moritz Ellinger.

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